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# NATURAL HISTORY.

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## M A M M A L I A.

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By P. H. GOSSE.

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PUBLISHED UNDER THE DIRECTION OF  
THE COMMITTEE OF GENERAL LITERATURE AND EDUCATION,  
APPOINTED BY THE SOCIETY FOR PROMOTING  
CHRISTIAN KNOWLEDGE.

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L O N D O N :

PRINTED FOR

THE SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE,

SOLD AT THE DEPOSITORY,

GREAT QUEEN-STREET, LINCOLN'S INN-FIELDS, AND 4, ROYAL EXCHANGE;

AND BY ALL BOOKSELLERS.

1848.

LONDON :  
Printed by S. & J. BENTLEY, WILSON, and FLEY,  
Bangor House, Shoe Lane.

## P R E F A C E.

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THE usefulness of the study of Natural History is now so fully admitted, that it needs not to be recommended. It is a branch of knowledge peculiarly appropriate to youth, inculcating many virtues and graces in a very pleasing manner; while its *attractions* are proved by the universality of the interest which young people take in its details. And though, in this reading age, works on the classification, structure, economy, and manners of animals are very numerous, yet such is the extent of the subject, and so rapidly are discoveries continually being made, that there is no fear of its becoming exhausted.

The following work embraces all the Families of the *Mammalia*; each of which is illustrated by a single genus and species; the technical characters of the Class, of the Orders, the Families, and the Genera, are given with scientific accuracy, but in language intelligible to all; their geographical distribution is particularly noticed; and the history of each selected species is given somewhat in detail, and interspersed with characteristic anecdotes. Pictorial illustrations of each species

described are added; besides many others which display important peculiarities of anatomical structure.

As far as it has been possible, the Author has drawn his illustrations from British species; for these are within the reach of all: and many young readers, it is hoped, may be induced to verify the statements they read in books, by personal observation of the living types that surround them. By this means, the knowledge acquired will possess an assurance (and a charm also) which mere reading can never bestow.

Finally, the exhibition of the wondrous structure of living beings, and its beautiful and perfect adaptation to the instincts implanted in them, should produce a reverential admiration of God as He has manifested Himself in His works of Creation, and be, under the Divine blessing, one of the means of leading the heart to an acquaintance with His work of Grace.

LONDON, *June*, 1848.

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# NATURAL HISTORY.

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## MAMMALIA.

THE Class of animals of which the present volume is intended to treat, comprises those which have an internal jointed skeleton of bone ; which breathe by means of lungs, through which the whole blood passes at each circulation ; and which bring forth and suckle living young.

In common language this class is denominated Quadrupeds or Beasts ; terms, which, though sufficiently appropriate as indicating the great majority of its subjects, are not in strictness applicable to it as a whole ; for, though the general character of the animals of this division is to possess four extremities, in one important Order, that of the Whales (*Cetacea*), the hinder pair of limbs is altogether wanting, or only exists in a rudimental condition. The fish-like forms and aquatic habits of these exclude them from the common notion of "Beasts," as much as the absence of hind feet from that of "Quadrupeds ;" yet in all characters which are really essential, they do not deviate from the ordinary members of the Class we are

about to consider, while in none do they manifest any near affinity to true Fishes. We are therefore constrained to designate the Class by a term founded on the last of the distinctive peculiarities enumerated above.

The sphere of action assigned to the Mammalia is the solid earth, on which they walk or run with various degrees of agility; some, however, burrow beneath its surface, as the Mole; others by a very interesting modification of the ordinary structure, emulate the rapid and continued flight of birds, as the Bats; while yet others, mostly of great bulk, inhabit the ocean, as the Seals and Walruses, the aquatic *Pachydermata*, and the *Cetacea*.

Certain important peculiarities of organization require the separation of the Mammalia into two divisions of very unequal extent, which are named *Placentalia* and *Marsupialia*. The details of these peculiarities would be unsuitable to the character of the present treatise; the most obvious is the presence of a remarkable pouch on the abdomen of the female in the *Marsupialia*, in which the teats are situated, and into which the young is transferred, at a very incipient stage of development, and there nourished till it is fully formed and its powers are somewhat matured.

## SUB-CLASS I. PLACENTALIA.

## ORDER I. QUADRUMANA.

*(Four-handed animals.)*

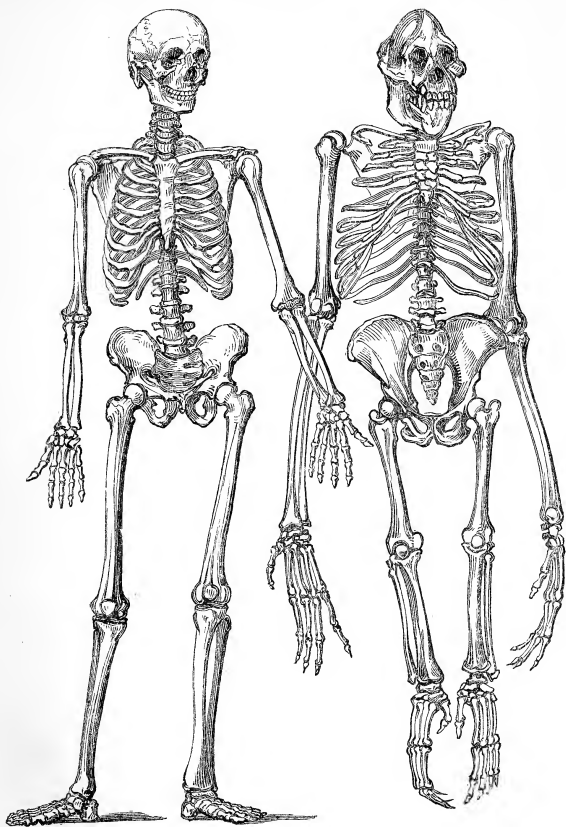
ALTHOUGH in the outward appearance of the animals which constitute this Order, as well as in their anatomical structure, there is a considerable resemblance to Man, it is not nearly so great as is commonly supposed; and a minute examination shows us that even these highest forms of the brute creation are separated by a vast interval from him to whom was originally delegated the dominion over them all.

The whole conformation of Man displays that an erect position is proper to him, and that he can never maintain any other. The skull, nearly globose, rests on the spinal column, almost in an even balance; while the face, containing the chief organs of sense, occupies its frontal portion. The spine itself, enlarging to the lower extremity, is there connected with the pelvis, the form, strength, position, and broad expanse of which adapt it to support the superincumbent weight of the trunk; and this weight is now, by a beautiful mechanism, transmitted to the posterior extremities, which in the form of nearly perpendicular pillars, pursue the same general line of direction as the trunk. The articulations of the bones of the leg, both at its upper and lower extremities, are so constituted as to compel a

vertical mode of progression; which is indicated also by the form and direction of the foot, by the mode in which the weight of the body is thrown upon the arch of the instep, by the projection of the heel for the attachment of the great muscles of the calf which raise the body in walking, by the breadth and flatness of the sole, and by the great toe, not having any power of opposing the others as a thumb, and therefore confining the use of the foot to that of an instrument of progression. The lateral breadth of the chest, throwing the shoulders wide apart, the mode in which the head of the shoulder is jointed to the blade, the structure of the elbow, fore-arm, and hand, the position of the heart and other viscera, the influx of blood to the head, not mitigated as in the brutes by subdivision of the arteries, as well as the form, comparative development, and arrangement of the muscles of various parts of his body, prove that Man is necessitated by his whole structure to assume that erect and commanding attitude, which is so becoming to him as a moral and intellectual being.

But in these important particulars, and in many others, the detail of which would be unsuitable to the present work, the brutes differ in anatomical structure and consequent habit from Man, though in various degrees; nor does the present Order offer any exception to this diversity, though some of its highest members approach nearer than others to his form and structure in some few of these particulars.

The Quadrumana are formed for an attitude neither erect nor horizontal, but diagonal in various degrees. They rest in a crouching posture,



SKELETONS OF MAN AND ORANG.

the thighs commonly drawn up to the body, so that by a sudden extension of the knee-joint, the animals spring with great vigour and rapidity. Their progression is not by walking on the ground, though, as we shall see, some of them can effect this awkwardly, but by climbing and bounding among the branches of trees, in the dense forests where they delight to dwell. It is to fit them for these arboreal habits, that their whole structure is modified. The development of the facial portion of the skull throws the centre of gravity considerably forward of the point of its junction with the spinal column, and this requires that the spinous processes of the bones of the neck should be enlarged, for the attachment of the muscles of the back of the head. The lower vertebræ of the spine are not gradually enlarged, as in Man, and therefore possess not the power of perpendicular support which a pyramidal form supplies, while the more narrowed form and weaker structure of the pelvis, the short and powerless thigh-bones, set at an obtuse angle with the line of the trunk, the leg-bones which can be brought into the same line as the thighs only by muscular effort, while their sustaining power is weakened by their capability of rotatory motion, the weakness (arising from the mobility) of the ankle, and the lack of the *pedal arch*, all manifest that the natural posture of even the most man-like of the Apes is considerably removed from the perpendicular. At the same time these peculiarities of structure are most beautifully adapted to the diagonal attitude, and climbing habits which we have alluded to as proper to the animals of this Order.

But it is in the character of the extremities that

the grand peculiarity of these animals resides, and by this they are separated from man by an interval wide indeed. They are quadrumanous, i. e. four-handed. Each of the four extremities is furnished with four long fingers, and a short thumb projecting at an angle from the line of the fingers, and opposable to them. But poorly fitted for progression on the ground, these long grasping hands are most effective instruments for seizing the branches of trees, and thus enabling the animals to proceed by a rapid and secure course through the mazes of the forests, and to reside among their umbrageous retreats as entirely as the perching birds. Many of our readers may have often observed a Monkey use his hind-hand to take hold of any presented object; for as we have already said, the bones of the posterior limbs have the same freedom of movement that marks those of the anterior pair, and thus the extremities of the former are endowed with the versatile powers confined in man to the hands. Yet even in the Orangs and Gibbons, there is a vast inferiority in their hands to those of Man. The thumb, small, feeble, and set far back, is but imperfectly antagonistic to the fingers; these again, greatly lengthened, and adapted thus for hooking round an object, have scarcely any power of separate motion among themselves; and the palm, instead of being hollow, is narrow, flat, and tapering from the wrist. "Compared with the hands of Man," observes Mr. Martin,\* "those of the *Simiæ* are rude and imperfect instruments: constructed as tree-climbing organs, they are incapable of the manipulations which the human hand executes

\* "Quadrupeds," p. 80.

with the utmost facility; notwithstanding they adequately serve the wants of these animals, and harmonize with their general economy. It is therefore in accordance with their arboreal habits, that the hinder graspers of the Simiæ are as hand-like as the anterior, perhaps more so; for in these latter organs, the thumb is far more developed; never, indeed, becoming rudimentary, even in those instances in which it is the most reduced in the anterior graspers."

The principal food of these animals is fruit; of which abundance is ripe at all seasons in the tropical forests: they also occasionally prey upon the young and eggs of birds, upon lizards, and insects.

The order Quadrumana consists of three Families, Simiadæ, Cebidæ, and Lemuridæ. The first of these is scattered over the tropical regions of Africa and Asia, including the great Indian islands; the second belongs to South America; while the third is nearly confined to the great island of Madagascar, where it alone represents the Order.

## FAMILY I. SIMIADÆ.

(*Monkeys of the Old World.*)

The distinctive characters of the Simiadæ are as follows:—Teeth, as in Man; viz. Incisors  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; false molars  $\frac{2-2}{2-2}$ ; true molars  $\frac{3-3}{3-3} = 32$ . Nostrils separated by a very narrow division. *Mammæ* two, pectoral. The majority possess also cheek-pouches, and callosities on the posterior part of the body, but to this there are exceptions in the highest animals of the series. Some have a membranous sac on the throat, connected with

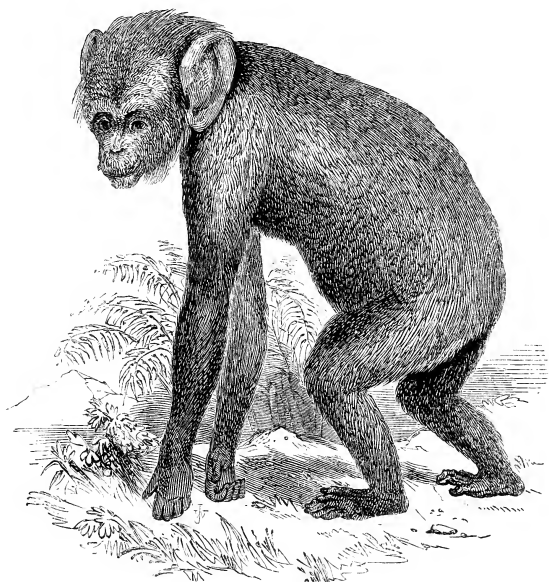
the wind-pipe, and capable of being inflated; it gives the power of uttering terrific cries. In the more man-like of the genera, the tail is altogether wanting, but in several others this member is of considerable length: the former are commonly known as Apes, the latter as Monkeys; while another natural division, under the name of Baboons, the most brutal of the family, possess a tail varying in length, but usually short, and in some reduced to a mere tubercle. In no case, in the Family before us, has the tail any prehensile or grasping power.

GENUS *TROGLODYTES*. (GEOFF.)

This, the most man-like genus of the Simiadæ, is distinguished by having the ears large and spreading; throat-sacs small; fore-hands reaching to the knee; callosities small; thumbs of hind hands always furnished with nails, thirteen pairs of ribs; no cheek-pouches; and no tail.

The only species yet known is the Chimpanzee (*Troglodytes niger*, GEOFF.), which inhabits Western Africa, from the River Gambia to the limits of Benguela, a tract including about twelve degrees of latitude on each side of the equator. Its height, when full-grown, seems to be at least five feet; some of the older writers say six or seven, which, from what we know of the Sumatran Orang, seems not improbable; the skin of a specimen in the Museum of the Zoological Society measures about four feet. It is clothed with long black hair, harsh and coarse, but somewhat glossy; thinly scattered on the breast and belly, as well as on the limbs: that on the fore-arm points upwards. The hair of the head is divided in the

middle, falling down on each side, and forming large whiskers on the cheeks. The eyes are lively, deep-set, and hazel-coloured. The face, ears, and



CHIMPANZEE.

hands are naked, of a dark brown colour, except the muzzle and palms, which are pale copper-coloured. The lips, which are large, wrinkled, and very moveable, are furnished with a thin white beard.

Many travellers in Western Africa have noticed these highly interesting animals, ascribing to them faculties and habits which might well startle our credulity, did not modern observations on youthful

specimens, which have been brought to England, render them highly probable. One of the earliest, and at the same time most sober of these accounts, is that of Andrew Battel, an Englishman, who was taken prisoner by the Portuguese in 1589, and sent by them to Angola, where he spent many years. In his narrative, published in "Purchas's Pilgrims," he says, "There are two kinds of monsters common to the woods of Angola: the largest of them is called Pongo, in their language, and the other Enjocko. The Pongo is, in all his proportions, like a man (except the legs, which have no calves); but he is of gigantic height. The face, hands, and ears of these animals are without hair; their bodies are covered, but not very thickly, with hair of a dunnish colour. When they walk on the ground, it is upright, with the hands on the nape of the neck. They sleep on trees, and make a covering over their heads to shelter them from the rain. They eat no flesh, but feed on nuts and other fruits; nor have they any understanding beyond instinct. When the people of the country travel through the woods, they make fires in the night, and in the morning; when they are gone, the Pongos will come and sit round it till it goes out, for they do not possess sagacity enough to lay on more wood. They go in bodies, and kill many negroes, who travel in the woods. When elephants happen to come and feed where they are, they will fall on them, and so beat them with their clubbed fists and sticks, that they are forced to run away roaring. The grown Pongos are never taken alive, owing to their strength, which is so great that ten men cannot hold one of them. The young hang upon their mother's belly with their

hands clasped about her. Many of them are taken by shooting the mothers with poisoned arrows." The same writer asserts that, on the death of one of these animals, the survivors cover the body with leaves and branches of trees. Purchas adds, in a note, that Battel had informed him, in private conversation, that he had known a young negro who had been carried away by the Pongos, and lived a whole year in their society. On his return, he reported that they had offered him no harm, and that they were of the stature of ordinary men, but much thicker and stouter.

The latest notice of the habits of the Chimpanzee in a state of nature, is by Lieut. Sayers, who obtained possession of a young one in 1838, which he brought to England. He concludes that it ascends trees only for food or for observation; from the negroes he learned that "they do not reach their full growth till between nine and ten years of age; which if true, brings them extremely near to the human species; as the boy or girl of West Africa, at thirteen or fourteen years old, is quite as much a man or woman as at the age of nineteen or twenty in our more northern climate. Their height, when full grown, is said to be between four and five feet: indeed, I was credibly informed that a male Chimpanzee, which had been shot in the neighbourhood, and brought into Freetown, measured four feet five inches in length; and was so heavy as to form a very fair load for two men, who carried him on a pole between them. The natives say that, in the wild state, their strength is enormous; and that they have seen them snap boughs off the trees with the greatest apparent ease, which the united strength

of two men could scarcely bend. The Chimpanzee is, without doubt, to be found in all the countries from the banks of the Gambia in the north, to the kingdom of Congo, in the south; as the natives of the intermediate parts seem to be perfectly acquainted with them. From my own experience, I can state that the low shores of the Bullom country, situated on the northern border of the River Sierra Leone, are infested by them in numbers quite equal to those of the commonest species of Monkey. I consider these animals to be gregarious; for, when visiting the rice-farms of the Chief Dalla Mohammadoo, on the Bullom shore, their cries plainly indicated the vicinity of a troop, as the noise heard could not have been produced by less than eight or ten of them. The natives also affirmed that they always travel in strong bodies, armed with sticks, which they use with much dexterity. They are exceedingly watchful; and the first one who discovers the approach of a stranger, utters a protracted cry, much resembling that of a human being in the greatest distress. The first time I heard it I was much startled; the animal was, apparently, not more than thirty paces distant; but had it been but five, I could not have seen it, from the tangled nature of the jungle; and I certainly conceived that such sounds could only have proceeded from a human being, who hoped to gain assistance by his cries, from some terrible and instant death. The native who was with me laid his hand upon my shoulder, and pointing suspiciously to the bush, said, ‘Massa, Baboo live there!’ and in a few minutes the wood appeared alive with them; their cries resembling the barking of dogs. My guide informed me that the cry first

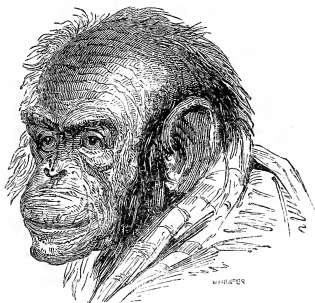
heard was to inform the troop of my approach, and that they would all immediately leave the trees, or any exalted situation that might expose them to view, and seek the bush; he also showed evident fear, and entreated me not to proceed any further in that direction. The plantations of bananas, papaws, and plaintains, which the natives usually intermix with their rice, constituting the favourite food of the Chimpanzees, accounts for their being so frequent in the neighbourhood of rice-fields. The difficulty of procuring live specimens of this genus arises, principally, I should say, from the superstitions of the natives concerning them, who believe they possess the power of 'witching.'\*\*

Several specimens of this interesting animal in its infancy, have at various times been brought to Europe, and the observations made on their manners in captivity have uniformly shewn it to possess a very high degree of intelligence of a peculiar character, great docility, and an affectionateness mixed with playfulness, far removed indeed from the character of the common Monkeys. The most interesting of all these individuals was a male, which lived in the menagerie of the Zoological Society about a year. For a considerable period after its arrival in September 1835, it continued in the best health and spirits, and having survived a winter in our cold and moist climate, hope was entertained that it might be reared to maturity. It died, however, in the following autumn. Several very pleasing accounts have been published of the manners of "Tommy," from which we select the following.

"On entering the room in which the Chim-

\* Proc. Zool. Soc. 1839.

panzee was kept," observes Mr. Martin, "the first thing that struck the attention of visitors was its aged appearance, and its resemblance to an old, bent, diminutive Negro.



PORTRAIT OF "TOMMY."

This appearance of age was much increased by a spare beard of short, white hairs, which was spread over the muzzle, and by the deep wrinkles which furrowed the cheeks. It was not until being informed of its age, which, as proved by its dentition, was in all probability about two years and a half, that a person, ignorant of the natural history of the Chimpanzee, would have considered this specimen in the light of an infant; its actions, however, were those of a child, capable of running about and amusing itself; lively and playful, yet neither mischievous nor petulant; it was alive to everything which took place about it, and examined every object within reach, with an air so considerate and thoughtful, as to create a smile on the face of the gravest spectator."\*

\* *Quadrupeds*, p. 382.

Another zoologist thus describes its manners in detail :

“ In the Zoological Gardens he occupied a room in the keeper’s apartments, in which a large cage was constructed for his accommodation, and which was kept as nearly as possible in an uniform temperature. Two artificial trees had been erected in the cage, and a rope suspended between them, to afford him an opportunity of amusing himself by climbing or swinging ; but unless when commanded by his keeper, to whom he invariably shewed a ready and willing obedience, he generally preferred running about the bottom of the cage, or amusing himself with the visitors. When moving quickly his pace was a kind of brisk canter, and unless when his hands were employed in carrying anything, he invariably walked on all-fours, leaning on the knuckles of the half-closed fist, as observed by Tyson and Dr. Traill. At the same time, the entire sole of the hind-foot was brought into contact with the ground in the act of progression, and as the arms were not very much longer than the legs, the body was stooped or bent at the shoulders, though the attitude, nevertheless, partook more of the erect than the horizontal. . . . .

“ But though, when perfectly free and unrestrained, his most usual mode of progression was on all-fours, Tommy could, nevertheless, adopt the biped pace and station with great ease, when occasion required it. His feet, and particularly his heels, were broader and better adapted for this purpose than those of the Orang-outan, and in walking upright he was not under the same necessity of stretching out his arms, or moving

them to and fro, for the purpose of securing his tottering equilibrium: the soles of his feet, however, were flat, and this circumstance, united to the greater distance and freer movements of his hind-legs, gave his gait a waddling motion, similar to that of human beings whose feet are affected with the same deformity. In many of his other actions; Tommy likewise approximated nearly to the human species. He was, without exception, the only animal we have ever seen, that could leap, or jump upon his hind-feet, like man; and this feat he often performed, both on the floor of his cage, and in descending from his tree, or from the bars of his cage, up which he often climbed for the purpose of seeing over the heads of the spectators. He frequently indulged, too, in a kind of rude stamping dance, perfectly similar to that of a child three or four years old, only that it was executed with greater force and confidence. All this arose from the uninterrupted spirits and buoyancy natural to the infant mind; he was at all times cheerful, lively, and perpetually in motion, from sunrise to sunset, either jumping, dancing, or cantering about his cage, romping and playing with the spectators, or amusing himself by looking out at the window.

“He did not often climb up his tree, unless at the command of his keeper; he appeared, indeed, to be upon the whole but an indifferent climber, particularly when compared with the Orang-outan, and generally preferred the level surface of the ground; whether it was that his tree was not properly constructed, or that he was too heavy and corpulent: but from his manifest awkwardness in performing this action, and his

evident preference of the level surface, it is highly probable, as, indeed, most travellers have affirmed, that the progression and habits of the species are more terrestrial than arboreal, and that they ascend trees, principally, if not solely, in search of food. When ordered to seat himself in his swing, Tommy did so with great good humour, stretching out his foot to some of the company to set him in motion. We observed that he used the right hand in preference to the left, and had obviously greater power and facility of action with this than with the opposite member. In the human subject this has generally been attributed to the effects of education; but in Tommy, at least, it was a natural action, since he was perfectly unsophisticated in this respect; and it would be a highly interesting inquiry to ascertain whether the same preference may not be exhibited in other apes, and consequently how far it may depend upon some necessary and inherent principle of the animal conformation, rather than upon mere education.

“All his actions were those of a human infant, and though his powers, both mental and physical, were, comparatively speaking, more developed, he had all the gaiety, playfulness, and curiosity of the child, the same innocence, the same gentleness, the same affection, and the same restless, pettish, and inconstant disposition; even his natural appetites and tastes were similar; he had the same natural fondness for sweets, the same propensity to eat at all times and of all substances, and equally preferred milk and tea to spirituous and fermented liquors.

“In natural shrewdness and sagacity, however,

Tommy greatly excelled the human infant, and, indeed, for that matter, many grown individuals. . . . . It is more particularly in interpreting your wishes and intentions from your looks, tones, and gestures, that this animal exhibited the most wonderful quickness of apprehension, vastly superior, indeed, to that of ordinary man, and only equalled by what we observe in deaf and dumb people, whose defect of speech is compensated by this unusual acuteness of observation. We have seen Tommy, on one occasion, when commanded by his keeper to bring him the core of an apple which he had thrown down on the floor of his cage, manifest the greatest anxiety to obey, though much perplexed to discover what it was he was required to do, as he evidently did not comprehend the nature of the order. He moved towards the window, stopped and looked back at the keeper, and then at the company; perceiving by their looks that he was mistaken, he returned, put his hand upon his swing as if to mount, again looked round to see if he was right, and was manifestly much puzzled what to do; at length one of the spectators pointed to the core of the apple; he stretched his hand towards it, looked inquiringly at the keeper, hesitated for a moment till he received the expected nod of approbation, and then lifted and carried it to his attendant without farther hesitation.”\*

GENUS *PITHECUS*. (GEOFF.)

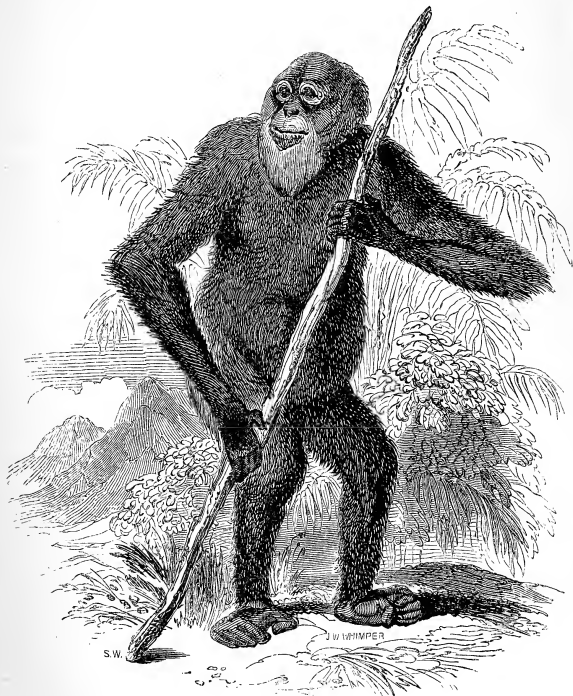
Considerably less man-like in many of its characters than the preceding genus, the Orang is

\* Lib. Ent. Kn. “Menageries,” i. 65.

distinguished by small external ears; a large double throat-sac; anterior extremities greatly developed, the hands reaching to the ankle; hinder hands very long and narrow, thumbs small, and often destitute of the nail and nail-joint; ribs twelve pairs; canines in adult male very large; no cheek pouches, no callosities on the rump; and no tail.

The great islands of the Indian Archipelago are the homes of this genus, particularly Borneo and Sumatra. Eminent zoologists consider that the specimens received from these two islands are of two species, distinguished as *Pithecus Wurmbii* (GEOFF.), the Bornean Orang, and *P. Abellii* (CLARK), that from Sumatra; the principal difference consisting in enormous callous excrescences on the temples and cheeks of the adult male of the former species, which seem to be wanting in the latter. Both attain to a great size and stature: a specimen has been recently obtained in Borneo, measuring five feet nine inches in height; while the individual of whose capture in Sumatra, Dr. Abel has given so interesting a narrative, is said to have attained the gigantic stature of seven feet six inches. The colour of the hair in both species is reddish brown, varying in individuals from a sandy hue to that of dark mahogany; it is copious on the sides, but scanty on most other parts. The disproportionate size and length of the arms, when compared with the legs, is a very marked character, and associated with the long and hooked character of the hands, shews that the Orang is more exclusively arboreal than the Chimpanzee. In young specimens the skull is large in the upper part, and the fore-

head is rather high, but in the adult male an immense alteration takes place ; while these portions have remained nearly stationary, the muzzle



BORNEAN ORANG.

and jaws have become monstrously developed, and the great canines, as large as those of the Lion, give an aspect, as well as the reality, of brutal power, that could not have been anticipated.

The Dutch zoologist, Dr. Muller, who has spent many years in exploring the great Indian islands, has had, in the course of his various excursions among the primeval forests of Borneo, many opportunities of studying the manners of the Orangs in their native fastnesses. "He describes them as being in the highest degree unsociable, leading for the most part a perfectly solitary life, and never more than two or three being found in company. Their deportment is grave and melancholy, their disposition apathetic, their motions slow and heavy, and their habits so sluggish and lazy, that it is only the cravings of appetite, or the approach of imminent danger, that can rouse them from their habitual lethargy, or force them to active exertion. When under the influence of these powerful motives, however, they exhibit a determination of character, and display a degree of force and activity, which would scarcely be anticipated from their heavy, apathetic appearance; whilst their strength is so redoubtable, that, without the aid of fire-arms, it would be impossible to cope with them. The natives of Borneo hold them in especial dread, and carefully avoid those parts of the forest which they are known to frequent. They are never seen on the ground, but constantly reside in trees, among the branches of which they make their way with surprising agility. Here they build a kind of rude hut, by intertwining the branches, in which they spend most part of their time, and seldom move abroad, except when urged by the calls of appetite. They feed entirely on fruits, and are never known to eat flesh, or even eggs, though young individuals, in a state of confinement, are readily taught to relish

animal food. Dr. Muller never met with the Orang-outan in Java or Sumatra; in the latter of which islands, however, he had heard of its existence, though it is seldom seen, and appears to be altogether of rarer occurrence than in Borneo.”\*

GENUS *HYLOBATES*. (ILLIGER.)

The Gibbons much resemble the Orangs, but are of smaller size and more elegant proportions: the hands reach to the heel; the thumb, separated to the wrist, is slightly opposible to the fingers; throat-sacs are found in some species only; very small callosities; no cheek-pouches; and no tail.

The Indian Islands and the Malayan Peninsula are the localities of the Gibbons. They are eminently adapted to an arboreal existence. “Free and unembarrassed, they appear almost to fly from bough to bough, and assume in their gambols every imaginable attitude: hanging by their long arms, they swing themselves forward with admirable facility, seizing, in their rapid launch, the branch at which they aimed; they throw themselves from a higher to a lower perch with consummate address, and again ascend to the loftiest with bird-like rapidity.” In these rapid evolutions the great length and power of their arms are of the utmost advantage; and of these they make a far greater use in progression than of their feet.

They live in troops in the dense forests; and some of the species make the air resound with the most piercing and terrific cries. In captivity, they

\* Menageries. i. 120.

manifest much gentleness, affection, and docility. The fur is longer and more copious than in the preceding genera; it is usually of a black colour, in some varied, however, by grey, yellow, or white. There are eight or nine known species; several of which are marked by the peculiarity of having the index and second toe of the feet united.

### GENUS *SEMNOPITHECUS*. (F. CUV.)

The presence of cheek-pouches, and of tails, and a decreased power of standing with ease on the hind hands, constitute so obvious a degeneration from that approach to Man, which we have noticed in the Apes, that the Monkeys, which we now come to describe have been recognised even by the vulgar as a well marked division of animals. In the genus before us, however, there is retained much affinity to the Gibbons; particularly in their slender contour, their small, round heads, and depressed faces, their large throat-sacs, their lengthened limbs, their small callosities, and the absence (in most of the species), of cheek-pouches. The stomach has the remarkable character of being three-fold, one of the divisions being puckered into a number of distinct sacs; and there are peculiarities in the teeth, that remind one of the teeth of a ruminant. It is curious also, that in the stomachs of this genus of Monkeys are found concretions resembling the *bezoars* of ruminating animals.

Many species of this genus attain considerable size; they are generally distinguished for the length, softness, and gloss of their fur, and some for the richness of their tints. The eyebrows,

consisting of long, stiff hairs, pointing forwards, give a marked aspect to their physiognomy. Their mental character seems to be more staid than that of the common Monkeys, manifesting less petulance, restlessness, and curiosity, but more real intelligence.



KAHAU.

We have adopted for illustration a species, which is certainly the most singular, if it is not the most characteristic, of the genus. The Kahau (*Semnopithecus larvatus*, WURMB,) differs from all other *Simiadae* in the enormous development of its nose, which forms a sort of proboscis, capable of being dilated, the connexion of which structure

with its economy is not known. The tail is shorter than in its congeners, and slightly tufted: a full beard adorns the sides of the face, curling upwards under the chin almost to the nose. The colours of this singular species are very beautiful; a fine pale red is the general hue, varied on the head and shoulders by rich chestnut, and on the cheeks and under parts by pale yellow; the limbs as well as the tail and rump are ashy, and the face and palms lead-coloured.

The male Kahau is a Monkey of large size; and from the development of his canine teeth, must be a formidable adversary: he has been described as of a savage and violent disposition, displaying courage and even ferocity in defence. We know, however, little of its habits. It is a native of Borneo, where, associating in large troops, they utter loud cries, which articulate the sound, *Kahau*. The species is not known in a state of captivity.

We content ourselves with a mere notice of the genera *Colobus* and *Cercopithecus*, both peculiar to Africa; the former of which is distinguished from the preceding genus by the rudimentary character of the fore thumbs; while the latter, having the hands well developed, have cheek-pouches and a simple stomach. These are the most common Monkeys of our menageries, and may be readily known by the hairs of the fur being annulated, giving a mottled character to the hue.

#### GENUS *CYNOCEPHALUS*. (Cuv.)

The Baboons are well known for their great heads and enormously developed muzzles, their

stout, thick-set forms, and short tails, as well as for the malignity of their savage countenances, their gigantic strength, and the brutal ferocity of their manners. They inhabit Africa, frequent rocky ridges more than sylvan forests, go on all fours, and subsist, for the most part, on scorpions, which they find under stones, and divest of their stings by a dexterous action of the thumb and finger.



CHACMA.

We select, for illustration of this genus, the Chacma of South Africa (*Cynocephalus porcarius*, DESM.), the colour of which is blackish brown,

with a greenish shade about the head; the face and hands being dark purplish blue. It is about equal in size, but greatly superior in power, to an English mastiff. They associate in troops in the mountains of the Cape, lodging in the dens and shelves of the rocks, up the perpendicular face of which they climb with astonishing facility, assisted by the slender stems of numerous creeping plants.

## FAMILY II. CEBIDÆ.

(*Monkeys of the New World.*)

The *Cebidæ* are distinguished by the following characters:—Teeth; inc.  $\frac{4}{4}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{6-6}{6-6} : = 36$ . Nostrils separated by a broad division. Tail long; in many cases prehensile, in others thick and bushy. No cheek-pouches, nor callosities. The distinctive character of the *Quadrumana*, the opposable power of the thumbs on all the extremities, is but slightly applicable to the American Monkeys. Mr. Ogilby, who has paid much attention to these animals, denies that in any genus of *Cebidæ* the thumbs of the fore hands are truly opposed to the fingers. These views are developed in a paper, published in a condensed form in the Proceedings of the Zoological Society for 1836, a part of which we subjoin.

“Of the eight natural genera, which include all the known Monkeys of the Western Hemisphere, one, *Ateles*, is entirely destitute of a thumb, or has that member existing only in a rudimentary form beneath the skin. In five others, *Myrcetes*, *Lagothrix*, *Aotus*, *Pithecia*, and *Hapale*, the

anterior thumbs (using the ordinary expression for them) are placed absolutely on the same line with the other fingers, are of the same form with them, act invariably in the same direction, and are totally incapable of being opposed to them. In the two remaining genera, *Cebus* and *Callithrix*, the extremities of the anterior limbs have a greater resemblance to the hands of Man, and of the Monkeys of the Old World:—the internal finger is placed farther back than the general line of the other fingers, and has, on that account, when superficially noticed, the semblance of being opposed to them: but, as has been correctly observed by D'Azara, with reference to *Call. capucinus*, it is less separated than in Man; it is, besides, of precisely the same slender form with the rest, is weaker than they, absolutely without power of opposition to them, and habitually acts in the same direction with them. The impression derived from contemplating the hands of the Old World Monkeys, might induce the belief that the extremities of the *Cebi* are similarly constituted; but if the knowledge that in *Mycetes*, *Pithecia*, &c., there are no opposable thumbs, leads to a close observation of the anterior extremities of the *Cebi*, it will be found that they do not act as hands, and cannot be considered as possessing the powers of those organs."

The *Cebidæ* are confined to the hotter parts of the Southern American continent, and inhabit the dense forests.

#### GENUS *MYCETES*. (ILLIGER.)

In this genus, which comprehends the largest and fiercest of the American Monkeys, the *hyoid*

bone\* is very large, swelling into a capacious drum, which communicates with the larynx, and imparts a tremendous power and volume to the voice, which they exercise in frightful nocturnal howlings. The head is of a pyramidal form; the tail, long, slender, powerfully prehensile, covered at the tip with a naked, delicate skin: the canines are very large and strong: the facial angle is low, about  $30^{\circ}$ ; which assimilates them to the Baboons of the Old World. They have generally large beards.



ARAGUATO.

Of the seven or eight species known, we select the Araguato (*Mycetes ursinus*, GEOFF.) for illus-

\* The bone at the root of the tongue.

tration. It is nearly three feet in length, exclusive of the tail; the long rough hair is of a golden red hue, paler at the circumference of the face. It is spread over the forests of Brazil and Venezuela.

Humboldt has described the terrific effect produced by the Howling Monkeys of Cumana. The forests resound with the frightful yells of a whole troop, the sound of which can be heard at a distance of two miles. They have been charged with a habit of assailing an intruder with sticks and fruits, but this is denied by Mr. Waterton. Their flesh is good food; the flavour being like that of kid.

#### GENUS *ATELES*. (GEOFF.)

With the prehensile tail of the preceding genus, the Spider-monkeys, as the species of *Ateles* are termed, have a small, round head, with a more elevated forehead; a corpulent body, and very long and slender limbs. The fore hands have, generally, no thumbs, but, in two species, there is a rudimentary one beneath the skin.

Exclusively arboreal, the Spider-monkeys are slow and vacillating on the ground, dragging themselves along by using the fore-arms as crutches, the fist being half closed; or walking in a crouching posture, on the hind feet only, balanced by the long arms and tail extended in front and rear, and ready to seize any object which may help progression. But among the branches of the trees their agility is almost equal to that of a bird: the sensible tip of the long tail seizes a branch with the facility and security of a fifth

hand, while its grasp is sufficiently powerful to support the weight of the body, as it swings from bough to bough. Dampier indeed asserts that when a troop wishes to cross a river, they select a very high tree that overhangs the brink, and mounting to the top, they form a long chain by each holding his predecessor's tail; the last securing a good hold of the tree, while he swings the living string of Monkeys slowly to and fro until it acquires a sufficient impetus to reach the trees on the opposite bank; when the foremost seizing a branch, the hindmost relinquishes his hold, and the whole are drawn up in succession. This plan has at least the merit of ingenuity.

This tail would seem to have almost the versatile powers of the Elephant's trunk: it has been affirmed that the animal will sometimes use it to fish for crabs; and Humboldt asserts that it is so sensible as to pick any little object out of a crevice, the monkey not thinking it needful to turn his eye to the spot.

Like the Howlers, the Spider-monkeys live in troops, and support each other in case of need; exercising a jealous tyranny over the part of the forest in which they may be residing. They live on fruits, insects, and the eggs and young of birds. Their character is intelligent, docile, and affectionate; somewhat grave and melancholy; free from the petulance and fickleness of common monkeys.

The Quata, (*Ateles paniscus*, LINN.) is covered with long and coarse hair, but soft and silky in texture, of a deep black; the face is copper-coloured. The thumb of the fore-hands is altogether wanting; but on the posterior extremities, it, as well

as the fingers, is long. Large companies inhabit the woods of Guiana; on the intrusion of man, curiosity impels them to come down to the lower branches to examine him, when they try to frighten him away. They are easily domesticated, and manifest much intelligence. D'Acosta, in his History of the West Indies, says of one belonging to the governor of Carthagena; "They sent the Quata to the tavern for wine, putting the pot in one hand, and the money in the other: they could not possibly get the money out of his hand before his pot was full of wine. If any children met him in the street, he would set his pot down and cast stones among the children till he had assured his way; then would he return to carry home his pot. And what is more, though he was a good bibber of wine, yet would he never touch it, till leave was given him."

### FAMILY III. LEMURIDÆ.

(*Macacos or Fox-monkeys.*)

In this Family the form closely approaches that of quadrupeds; the muzzle is lengthened and pointed, and the nostrils are terminal: the thumbs of all the extremities are well developed and opposible, but the index finger of the hind hands bears a narrow pointed claw, while all the rest have broad nails. The number of teeth varies in different genera; the *molars* begin to exhibit sharp tubercles, which catch in each other, as among the *Insectivora*.

Most of the members of this family are peculiar to Madagascar, but some inhabit the African

continent, and a few more the East Indies. They do not generally exceed the size of a cat.

### GENUS *LEMUR*. (LINN.

These pretty animals, the species of which are numerous, are confined to the great island of Madagascar, in which they may be considered as the representatives of the Monkeys. In appearance and economy they resemble these well-known animals, except in the head, which in form bears a strong likeness to that of a Fox. The dentition is as follows: inc.  $\frac{4}{4}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{6-6}{6-6}:=36$ : the lower incisors and canines are compressed, and point forwards; the upper canines are trenchant. Ears small: tail very long; fur woolly and soft; teats two, pectoral. They are rather less in size than a cat, are active, nimble, watchful animals; cleanly in their habits, easily tamed, gentle and playful. Their voice is a shrill whistle, or a guttural grunting. Night seems to be the season of their activity; and like many other nocturnal animals, the pupil of the eye contracts and expands strongly under stimulus or excitement. They eat fruit and insects.

The species differ little among themselves: we select to illustrate the genus, *Lemur albifrons* (GEOFF.), the White-fronted Lemur, which has been kept in the Zoological Gardens, in the Regent's Park. Its colour is reddish brown, but a band across the forehead, as well as the neck and interior surface of the arms is pure white. "The bounding elasticity of this species," says a naturalist, who kept a specimen in captivity, "when familiar and quite at its ease, is wonderful. It pitches, after a leap

of many yards, so lightly as hardly to attract the notice of the ear when it alights. If it take a leap from a table to the back of a distant chair, or even to the upper angle of an open door, it never



WHITE-FRONTED LEMUR.

misses its hold. Under the points of the fingers are elastic cushions, which no doubt assist it in performing these feats. It is a very affectionate animal, and a most amusing companion. Our limits will not permit us to indulge in an account of one which we kept, and which was suffered to go at large. When tired with playing about in

the evening, its favourite perch was on the instep of the uppermost leg of his master, as he sat cross-legged before the fire. Having obtained leave, he used to take his seat, wrap his boa-like tail round his shoulders and back, and enjoy his nap." \*

GENUS *GALEOPITHECUS*. (PALL.)

The Quadrumanous Order is connected with the following by this very singular genus, which inhabits the most eastern islands of the Indian Archipelago. It consists of two species, Lemurine animals, of the size of a cat, which are furnished with a membrane expanded between the fore and hind limbs on each side, and continued between the latter, so as to include the tail. The fingers are included in the membrane, but are not greatly lengthened, as in the Bats.

Though not capable of sustained flight, the *Galeopithecus* is enabled by this parachute to take long sweeping leaps from tree to tree, and thus to traverse the forests in search of food, which is believed to consist of fruits and insects. Its activity is nocturnal: during the day it hangs by the hinder claws from a branch, in the manner of a bat. It diffuses a rank, disagreeable odour; yet the flesh is eaten.

The dentition of these animals differs from that of the Lemurs only in wanting the upper canines.

\* Penny Cyclopædia; Art. LEMURIDÆ.

## ORDER II. CHEIROPTERA.

*(Hand-winged Animals.)*

THE Bats constitute an Order of Mammiferous animals so distinctly marked as to be recognised, without possibility of error, at a glance. The structure which belongs to them in common with other quadrupeds, is so modified as to give them the powers and habits of birds. This is effected by the elongation, to an extraordinary extent, of the anterior extremities, and particularly of the fingers, which, diverging from the wrist, afford so many spokes for the expansion of an attached membrane, as the ribs of an umbrella expand the silk. An extremely delicate and sensitive skin, copiously supplied with blood-vessels and nerves of sensation, commences at the sides of the neck, embraces the whole arm and hand, with the exception of the thumb, extends from the little finger to the instep of the hind foot, and thence to the tip or middle of the tail, where this organ is present, or, where it is absent, to the hinder part of the trunk. A lengthened bone, proceeding from the heel, assists the tail in the expansion of this *interfemoral*\* portion of the membrane, or where there is no tail performs that office alone, and gives to this part the power of governing the direction of the flight, like the spread tail of a bird.

The broad expanse of surface thus obtained is not merely available to sustain the animal upon the air, as by a parachute, in long leaps; but is

\* *i. e.* between the thighs.

capable of striking the air with sufficient force and rapidity to produce a true flight, easy, swift, and continued. The *sternum*, or breast-bone, has a ridge as in birds; and the muscles which are attached to it, and which move the arm, are thick and powerful.

The volar membrane, though so thin as to be nearly transparent, is exceedingly sensible; it is seen, on being held up to the light, to be studded with innumerable little white *papillæ*,\* which run in irregular lines, and which, consisting probably of nervous matter, may be conjectured to be the seat of the extraordinary delicacy of touch with which this membrane is endowed; a delicacy so great as to enable the animal after its ears and eyes have been cruelly destroyed, to avoid threads stretched in various directions across its flight, and to pass through the narrowest passages without touching the sides.

It has been ascertained that the interfemoral part of the membrane has another interesting use. By the curving upward of the tail, the hind feet being extended, the membrane forms a hollow cradle, into which the newborn young is received.

The Bats are exclusively nocturnal animals. During the day they congregate in hollow trees, in caverns, or in unfrequented buildings, where they suspend themselves, with the head downwards, by means of the strong and curved claws of the hinder feet. In the same gloomy recesses, the species which inhabit the temperate zone pass the winter in a state of torpidity.

The species of this Order are very numerous, and are scattered over all parts of the world, with

\* Minute warts or projections, like those on the tongue.

the exception of the Arctic regions; and seventeen of these have been recognised as inhabiting the British Islands. They are distributed in two Families, *Pteropidæ* and *Vespertilionidæ*.

## FAMILY I. PTEROPIDÆ.

(*Fruit-eating Bats.*)

This Family, though small in the number of its genera and species, contains the largest of all the Bats; some of them exceeding five feet in expanse of wing. They have cutting incisors in each jaw, and tuberculated molars, the crowns of which are longitudinally grooved. They are thus fitted for subsistence on fruits. The wings are somewhat rounded; the interfemoral membrane and the tail are always small, sometimes wanting. The thumb is large, the fore-finger short, sometimes nailed, possessing three *phalanges*, or joints, while the rest have but two. The head is long and pointed; the muzzle has no appendages, nor the ear a tragus.

The species, which are sometimes called Roussettes, are found in the islands of the Indian Ocean and the surrounding coasts, in Japan, Madagascar, and South and West Africa.

### GENUS *PTEROPUS*. (BRISS.)

These Bats are often known by the name of Vampire Bats, though the distinctive term *Vampyrus* is now applied to a genus of another Family. They are without any tail, and the interfemoral membrane is very scanty: the teeth are inc.  $\frac{2-2}{2-2}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{5-5}{5-5}$ ; = 32. Upwards of twenty species of this genus are known, chiefly

inhabiting the Indian Archipelago; their flesh is eaten, and is by some esteemed, and compared to that of Hare or Partridge in flavour.

The largest, as well as the most common in our collections and museums, is the species named the Black-bellied Roussette (*Pteropus edulis*, GEOFF.), specimens of which have been seen which measured five feet and a half in spread of wing. The fur of this animal, which is crisp and coarse, is of a blackish hue, deeper on the under parts. In the Moluccas, or Spice Islands, it associates in flocks, which by night commit great depredations on the fruit, and by day are seen hanging in groups from the branches of the trees. Occasionally they emit a loud harsh cry, like that of a goose. The flesh has a musky odour, but is esteemed by the natives; who, to procure it, take great numbers with a bag at the end of a pole.

## FAMILY II. VESPERTILIONIDÆ.

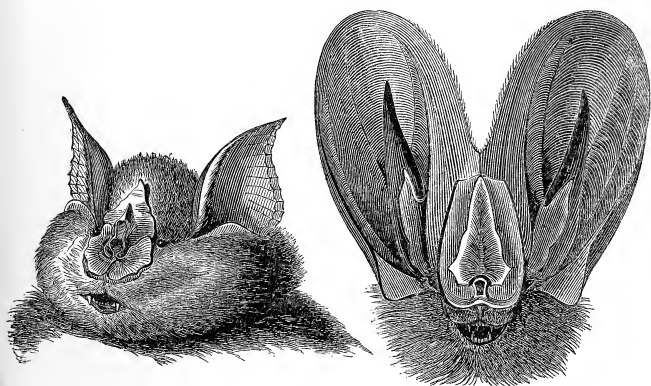
(*Insect-eating Bats.*)

The great majority of the numerous species of the Cheiropterous order belong to this Family, the food of which consists, for the most part,\* of insects. The true molars, of which there are six in each jaw, are set with conical points: the fore-finger has no nail, and no more than two phalanges: the interfemoral membrane is commonly large, the tail long, and, either wholly or in part, enveloped in the membrane. Many of the species have cheek-pouches; and most of them utter a

\* Some of the Phyllostomes (*Vampyrus*) in Jamaica, we have observed to feed on fruit; and others, as *Glossophaga* and *Desmodus*, are said to suck the blood of larger animals.

peculiar clicking sound, which, as it is frequently emitted when the mouth is wide open, is probably produced in the throat. The Marmoset Monkey (*Jacchus*) we have heard utter a similar sound.

One large division of the Family have an extraordinary development of the skin of the face, sometimes taking the form of a leaf or an arrow-head, standing up from the nose; at others assuming an appearance too complicated for description. The ears, also, are, in general, large, and in many species, the *tragus* is so lengthened as to seem a second ear. The membranes of the ears, in some cases, meet above the head, and in others are produced, with strange convolutions, along the cheek



HEADS OF BATS ;

*Rhinolophus ferrum-equinum*, and *Megaderma frons*.

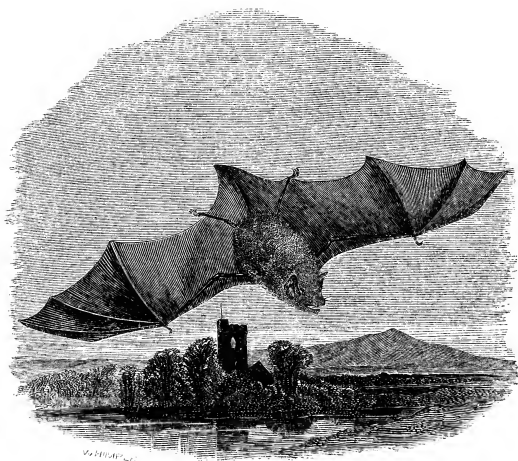
to the muzzle. These expansions of naked and sensitive skin, in addition to the volar membrane, no doubt increase the peculiar capacity which the

Bats are known to possess, of receiving impressions from the impact of the air.

This family is known to be spread over all parts of the world; and doubtless very many species yet remain to be described.

### GENUS *VESPERTILIO*. (LINN.)

Twelve species of this extensive genus have been recognised as inhabiting this island, and perhaps more may yet be discovered. They are distinguished by having a simple muzzle; teeth, inc.  $\frac{2-2}{3-3}$ ; can.  $\frac{1-1}{1-1}$ ; false mol.  $\frac{\text{variable}}{\text{variable}}$ ; mol.  $\frac{3-3}{3-3}$ ; ears



PIPISTRELLE.

separate, scarcely larger than the head; and the tail enveloped in the membrane. The pretty little Pipistrelle (*Vespertilio pipistrellus*, GEOFF.), one

of the smallest as well as most common of our English Bats, will illustrate the genus. The length of its head and body is about an inch and a half, and that of the tail less than an inch and a quarter more; while the expanse of the wings in flight does not much exceed eight inches. It is of a reddish-brown hue, the under parts being paler than the upper.

This little bat resorts to the eaves and crevices of buildings for concealment by day, and during its winter torpidity. It is more easily roused than our other species, and is active at a lower temperature; hence it is occasionally seen abroad on fine days very late in the season, pursuing the gnats and *tipuladæ*\* which often dance in the winter's sun. We have repeatedly seen bats, doubtless of this species, coursing through the most thronged streets of the metropolis, on an afternoon in November; and Mr. Bell mentions a specimen which was shot just before Christmas. As early as the middle of March it is again active, and commences its long summer-campaign against the humming swarms of the evening air. To us there has always seemed something particularly pleasing in the flight of the little harmless Bats. We naturally associate with them the soothing quietude of evening, the warm sunset with its gilded clouds fading into night, the placid face of the moon, the brawling of the pebbly brook, the darkening surface of the pool, the solemn gushes of the nightingale's song, the spark of the glowworm in the herbage, and the thousand mingled perfumes that come from the hedgerow and the field. Then comes the little Bat flitting around us on silent

\* Small insects, resembling gnats.

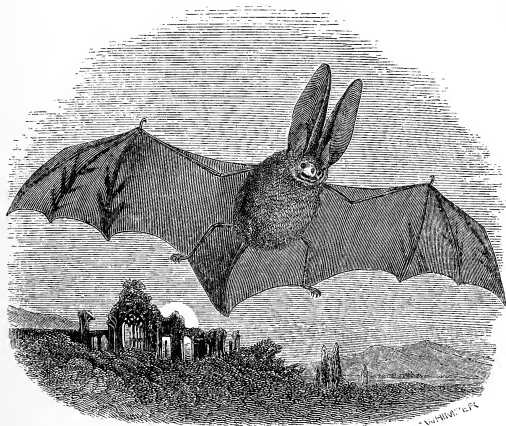
wing, seen for a moment, then lost in the increasing gloom, now skimming along the brim of the brook, now coursing round the tops of the trees, now darting through the lanes, and now wheeling in tortuous mazes among the insect swarms above our heads.

The common error that Bats cannot rise from the ground to flight, but require to throw themselves from an elevation into the air, has been so often contradicted, that it seems needless to refer to it, but that even such naturalists as M. Geoffroy repeat it. We can testify from personal observation, that several tropical genera have the same facility in flying from the ground as those common in Europe. "This observation," remarks Mr. Bell, of the error of Geoffroy, "is totally incorrect as to the present, and probably every other species. I have seen the *Pipistrelle* rise from a plain surface with a sort of spring, instantly expand its wings and take flight." The same naturalist notices a curious peculiarity of this species, before unobserved. "It is the prehensile character of the extremity of the tail. A small portion of the tail in this, and in most other species of this family is exerted beyond the margin of the interfemoral membrane. Not only does the animal employ the tail in horizontal progression,—in which case it assists in throwing forward the body, by being brought into contact with the ground on either side alternately, corresponding with the action of the hinder foot on the same side,—but in ascending and descending a rough perpendicular surface, this little caudal finger holds by any projecting point, and affords an evident support. This is particularly conspicuous when the Bat is

traversing the wires of a cage, in which situation I first observed the fact.”\*

GENUS *PLECOTUS*. (GEOFF.)

The ears in this genus are greatly elongated, ordinarily erect, but capable of falling into elegant curves with minute transverse wrinkles: the aural membranes are united over the head, and the tragus is long and tapered to a blunt point. The muzzle is simple, the tail long, wholly enveloped. The teeth,—inc.  $\frac{2-2}{3-3}$ ; can.  $\frac{1-1}{1-1}$ ; f. mol.  $\frac{2-2}{3-3}$ ; mol.  $\frac{3-3}{3-3}$ : = 36.



LONG-EARED BAT.

Our common species, known as the Oreillard, or Long-eared Bat, (*Plecotus auritus*, GEOFF.) is scarcely less abundant than the Pipistrelle; it

\* Brit. Quad. p. 27.

is of a dusky grey hue, paler on the belly, with ears more than twice as long as the head, and nearly as long as the head and body together. Like the preceding, it is active on the ground, but has a different mode of proceeding. "In crawling or walking along a horizontal surface, it has the anterior part of the body considerably elevated above the ground, and its progression is effected by a succession of abrupt impulses or leaps of one side after the other; whilst the *Pipistrelle*, which never raises the head from near the ground, runs along in an almost prostrate position, but with much celerity and freedom."\*

Timid as the Bats are, gentleness will render them confiding and familiar. The present species is active and playful in confinement, and may readily be trained to take a fly from the hand. Mr. Bell speaks of one which, "when at liberty in the parlour, would fly to the hand of any of the young people who held up a fly towards it, and pitching on the hand, take the fly without hesitation. If the insect were held between the lips, the Bat would then settle on its young patron's cheek, and take the fly with great gentleness from the mouth: and so far was this familiarity carried, that when either of my young friends made a humming noise with the mouth in imitation of an insect, the Bat would search about the lips for the promised dainty."\*

None of our native Bats are in any respect injurious to man; but on the other hand, as the destroyers of numberless insects which in one stage or other are noxious, we cannot but consider them as absolute benefactors.

\* Brit. Quad. 26.

† Brit. Quad. 54.

## ORDER III. INSECTIVORA.

(*Insect-eating Animals.*)

IN their diminutive size, and the character of their food, the animals comprised in this Order agree with the majority of those which we have just noticed; but they have no extraordinary development of the skin, and consequently are destitute of any power of flight. Like the Bats, however, their activity is chiefly nocturnal, and they for the most part conceal themselves in burrows in the ground, as the former do in caves and hollow trees. To enable them to feed on insects, their *molar* teeth are beset with conical points; the position and proportions of their *canines* and *incisors* vary in different genera. Their motions are comparatively feeble; the feet are short and slender, and the whole sole is placed upon the ground in walking. The snout is usually more or less lengthened.

The species, with the exception of the Shrews, are not very numerous; but they are scattered over both continents. South America and Australia are, however, destitute of them. In northern climates most of them pass the winter in a dormant insensibility. They are arranged in three families, *Erinaceadæ*, *Talpadaæ*, and *Soricidæ*, each of which is represented by British species.

## FAMILY I. ERINACEADÆ.

(Hedgehogs.)

The Hedgehogs are distinguished by being covered, more or less exclusively, with spines or stiff bristles. In one foreign genus (*Gymnura*) however, spines are mingled with woolly hair. They have the faculty of rolling themselves up into a ball; and thus, presenting only an array of stiff spines pointing in every direction, are well defended from injury. All their limbs are formed for walking.

The genera are confined to the Old World; the true Hedgehogs (*Erinaceus*) are distributed over Europe, Asia, and Africa, while others are assigned to Madagascar, and the Oriental Islands.

GENUS *ERINACEUS*. (LINN.)

A body covered wholly with stiff spines; a pointed muzzle; a short tail; together with peculiarities of the teeth, mark the genus *Erinaceus*, of which our common Hedgehog or Urchin (*E. Europæus*, LINN.) is a familiar example. The dentition, according to M. F. Cuvier, is as follows:—inc.  $\frac{6}{2}$ ; can.  $\frac{0-0}{0-0}$ ; mol.  $\frac{7-7}{7-7}:=36$ ; but some naturalists consider the anterior two false molars on each side of the lower jaws to be incisors. The cutting teeth of the upper jaw are long, robust, and prominent.

The inoffensive Hedgehog is well known in the rural districts of this country, for its singular, but most efficacious means of defence against injury.

Slow of foot, it cannot flee from danger, nor has it any natural weapons of offence; but in the sharp, hard, and tough prickles of its coat it is endowed, as Mr. Bell observes, “with a safeguard more secure and effectual than the teeth and claws of the Wild Cat, or the fleetness of the Hare.” A remarkable array of powerful muscles exists beneath



HEDGEHOG.

the skin of the whole body, by the contraction of which the animal, on the slightest alarm, is able to roll itself up into the form of a ball, the head and limbs being enclosed in the centre. The more forcible the muscular contraction, the more rigidly do the spines project from every part of the surface, so that it cannot be touched with impunity. A thorough-bred Terrier, however, will sometimes

succeed in forcing open the poor Urchin, “at the expense of a bloody nose, and sorely pricked paws;” and immersion in water more readily produces the same effect.

The food of the Hedgehog is not confined to insects and worms : Mr. Jesse speaks of its eating frogs, and of its mousing like a cat; and Mr. Broderip has described an interesting experiment which proved that it feeds upon snakes. The Hedgehog unfolding itself suddenly, gave the snake a severe bite, and instantly rolled itself up again. Having by another bite, broken the back of the reptile, it passed the whole length of the body through its jaws, breaking the bones at each bite; having done which, it began to eat the snake from the tail upwards, “as one would eat a radish.” It also eats vegetable food. White of Selborne affirms that it gnaws off the root of the plantain, boring under the plant, and leaving the tuft of leaves untouched. It also devours fruits; and in a state of domestication it is fed upon soaked bread or boiled vegetables. It is not unfrequently kept in kitchens, for its service in hunting and devouring cockroaches. Its activity is nocturnal; during the day it lies snugly housed in a hole at the root of some tree; where, too, in a warm nest of moss and dry leaves, which it has collected, it passes the winter months, coiled up in insensibility.

The young ones, which are frequently called Hedgepigs, are born blind; the points of the spines already project from the skin, but are yet soft and flexible. Some time elapses before they acquire the power of completely rolling themselves up. The female is a careful and attentive mother.

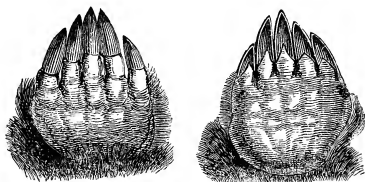
The Hedgehog is susceptible of kindness. Mr. Bell records of one in the possession of a friend, that it would unfold and lie on its master's knees before the fire, suffering him to rub the naked parts of its face, and appearing to feel pleasure from the action. Mr. Jesse tells of a tame one which he had, that was accustomed to "nestle before the fire on the stomach of an old lazy terrier dog, who was much attached to it; and the best understanding existed between them." Uniform kindness of treatment, will produce in almost all animals correspondent confidence and affection.

## FAMILY II. TALPADÆ.

(*Moles.*)

Destined to burrow in the earth, the Moles are marked by an organization, beautifully adapted to such a habit. The general form is nearly cylindrical, the head produced into a long muzzle, tapering almost to a point. The limbs are very short; there are no external ears, and the body is covered with the softest fur; all which characters are favourable to unimpeded progression through the earth. But though the limbs are short, they (the fore ones in particular) are of prodigious strength, and it is in an examination of these organs that we are struck with the admirable correspondence between the structure of these animals and their habits. Scarcely more than the fore paw projects beyond the skin, which is widened into a broad, hollow hand, the palm of which is directed outwards and backwards; and the fingers are terminated by very strong claws or

nails, the under part of which is grooved. Thus a compact shovel is formed, which, digging away the earth from each side of the boring muzzle,



HAND OF MOLE.

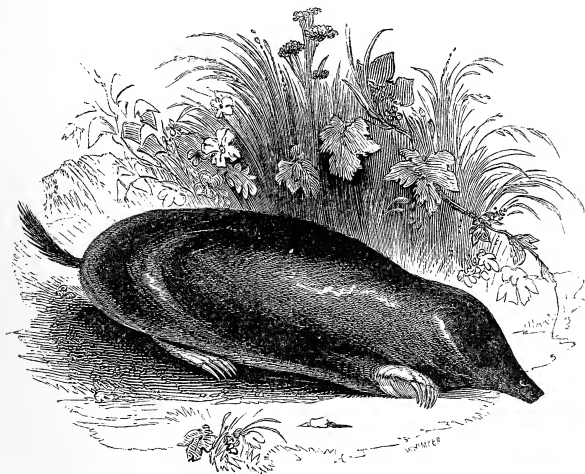
throws it back into the burrow through which the animal is passing. The internal conformation of the fore limbs is no less remarkable than that which is external. The bones are very short, but of great strength and thickness; the shoulder-blade is greatly enlarged; and the breast-bone (*sternum*) is furnished with a ridge or keel, for the attachment of the large pectoral muscles, as in the case of the Bats, and more markedly, of Birds. The muscles of the arm and hand, of the neck, and of the chest, are of extraordinary vigour; and in the ligament of the neck, and in the muzzle, there are peculiar bones, which strengthen these parts in the laborious act of boring into the solid earth. The hinder parts are comparatively feeble; the great development of power being in the anterior half of the animal.

#### GENUS *TALPA*. (LINN.)

The true Moles have the teeth thus arranged:—inc.  $\frac{6}{8}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{7-7}{6-6}=44$ :—the incisors are nearly equal; the canines large, triangular, and

compressed. The eyes are very small, and nearly or quite concealed; the tail is short; the muzzle is simple; there are nails upon all the toes.

The structural peculiarities of the Moles having been briefly described in our notice of the Family, we have now to speak but of their economy. The species are but few, and our common Mole or Want (*Talpa Europæa*, LINN.) is a fair representative not only of the genus, but also of the Family, in which there is little variety, either of form or habits.



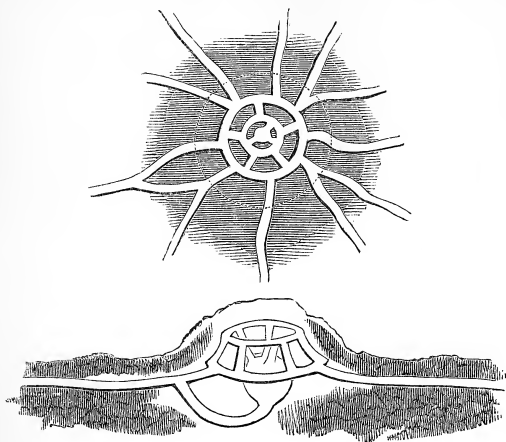
MOLE.

The beautiful appearance of the fur, its velvety softness, and the play of light upon its surface, are well known, as it is frequently used for purses. The last circumstance, the changing gleam of light,

depends upon a remarkable peculiarity in the mode in which the fur grows. Each hair, instead of projecting from the skin obliquely backwards, as is usual, grows perpendicularly from the surface, without any inclination; so that like the pile of velvet it will lie in any direction in which it is rubbed: an interesting provision for an animal which often has to retreat rapidly backwards through a burrow too narrow to admit of turning. Though usually deep black, or silvery gray, according to the light, the Mole is sometimes found of a cream-colour, and occasionally of a bright orange hue.

The burrowing of the Mole is not a mere perforation of the earth at random, in search of the earth-worms (its ordinary food,) that are everywhere scattered through the soil. It is, on the contrary, performed with consummate art and regularity. A central "fortress" is constructed so elaborately as to excite our admiration of the wisdom and goodness of God in endowing this little despised animal with instincts so extraordinary. In some situation of security, as under a bank or at the foot of a wall, a large hillock is formed of earth, which the Mole by pressing and beating has rendered compact. Within this dome the habitation or fortress is excavated. A circular gallery runs within the base, which communicates with one of less diameter above it, by five distinct passages. Three other passages lead from the latter to a chamber within the basal gallery, which is the resting place of the Mole. From the basal gallery a passage extends to the extremity of the domain which the animal uses as his hunting ground. It differs from the ordinary excavations, and has been called the "high road." It is

formed indeed rather by the compression of the earth into the sides, than by excavation; and hence it is very smooth and compact, being traversed several times every day. Its width, too, is



FORTRESS OF THE MOLE.

greater than that of the mole's body. A passage from the central chamber descends perpendicularly, and rising at some distance from the fortress enters the high road. From various points in the basal gallery, about nine other passages stretch out like the spokes of a wheel, but all these curve round, and enter the high road at various distances. It is worthy of observation, that the connecting passages of the galleries and the chamber, never open opposite each other. In this curious abode the Mole resides during the summer, and from it, he perforates the surrounding domain by

passages continually formed and pushed in all directions from the high road. "Nothing surely," observes Mr. Bell, in describing this interesting construction, "can be imagined more admirably calculated to ensure the security or the retreat of the inhabitant, than such an arrangement of internal routes of communication as this. The chamber communicating beneath directly with the road, and above with the upper gallery,—this with the lower by five passages, and the latter again with the road by no less than nine,—exhibit altogether a complication of architecture, which may rival the more celebrated erections of the Beaver."\*

The Mole is an object of strong dislike to the farmer, who attributes much damage to the corn and other crops to the excavations of this animal: it is, however, by no means certain, that the evil is not counterbalanced by the destruction of various noxious larvæ and worms. Mr. Jesse considers that sheep thrive better in pastures where mole-hills are abundant, than where they are levelled and destroyed; and he confirms his own judgment by the opinion of the Ettrick Shepherd.†

### FAMILY III. SORICIDÆ.

(*Shrews.*)

The feet of the Shrews are formed for walking, or for swimming, distinguishing this family from the preceding; while their coat of soft fur is destitute of the spines that mark the Hedgehogs.

\* Brit. Quad. p. 93.

† Gleanings, p. 137.

They have, however, on each flank, a band of stiff, close-set bristles, beneath the fur, among which are placed the orifices of some small glands, that exhale a musky odour. In general, they are aquatic, in a greater or less degree.

### GENUS *Sorex*. (LINN.)

The animals of this genus are small and mouse-like, covered with a short and very soft fur. Their dentition is thus expressed:—inc.  $\frac{2}{2}$ ; can.  $\frac{0-0}{0-0}$ ; mol.  $\frac{8-8}{5-5}=30$ . The incisors are long; the upper ones are curved and notched at the base; the lower



WATER SHREW.

nearly horizontal. The muzzle is produced into a long slender snout; the ears are short and rounded; the tail moderately long.

The British Islands possess several species of these pretty little creatures, of which we select the Water Shrew (*Sorex fodiens*, PALL.) for illustration, perhaps the most beautiful of the genus. The silky coat of this species is on the upper parts nearly black, the under parts being pure white, and the contrast of the colours is heightened by their being well-defined at their separation. The tail and feet are fringed with stiff white bristles, which give an oar-like character to these organs, and indicate aquatic habits.

Mr. Dovaston has described, in a very agreeable manner, some particulars of the economy of this pretty little creature. “On a delicious evening, far in April 1825, a little before sunset, strolling in my orchard, beside a pool, and looking into the clear water for insects I expected about that time to come out, I was surprised by seeing what I momentarily imagined to be some very large beetle, dart with rapid motion, and suddenly disappear. Laying myself down cautiously and motionless on the grass, I soon, to my delight and wonder, observed it was a mouse. I repeatedly marked it glide from the bank under water, and bury itself in the mass of leaves at the bottom: I mean the leaves that had fallen off the trees in autumn, and which lay very thick over the mud. It very shortly returned and entered the bank, occasionally putting its long sharp nose out of the water, and paddling close to the edge. This it repeated at very frequent intervals, from place to place, seldom going more than two yards from the side, and always returning in about half a minute. I presume it sought and obtained some insect or food among the rubbish and leaves, and retired to

consume it. Sometimes it would run a little on the surface, and sometimes timidly and hastily come ashore, but with the greatest caution, and instantly plunge in again. During the whole sweet spring of that fine year, I constantly visited my new acquaintance. When under water he looks grey, on account of the pearly cluster of minute air-bubbles that adhere to his fur, and bespangle him all over. His colour, however, is very dark brown." . . . After entering into some descriptive details of the specimen, Mr. Dovaston proceeds: "This minute description I am enabled to give, having caught it in an angler's landing net, and carefully inspected it in a white basin of water. The poor creature was extremely uneasy under inspection, and we soon, with great pleasure, restored it to liberty and love, for he had a companion, which from her paler colour and more slender form, we doubted not was his mate, and were fearful, by our intrusion, of giving offence to either.

"He swims very rapidly; and though he appears to dart, his very nimble wriggle is clearly discernible. He is never seen till near sunset, but I saw him every evening I watched, with the most perfect facility. They are easily discovered about the going down of the sun, on still evenings, by the undulating semicircles quickly receding from the bank of the pool, when they are dabbling at the side. I believe this to be the animal said to be so long lost in England, the Water Shrew (*Sorex fodiens* of Pennant). . . . I have said he only appears at evening, and such are his general habits. Once, however, at broad and bright noon, while leaning on a tree, gazing on the sun-sparkles

passing (like fairy lights) in numberless and continual succession under the gentlest breath of air, I was aware of my little friend running nimbly on the surface among them. My rapture caused me to start with delight, on which he vanished to security within his rush-fringed bank. . . . I should have mentioned that, on very still evenings, when my ear was close to the ground, I fancied I heard him utter a very short, shrill, feeble sibilation, not unlike that of the grasshopper lark, in mild, light summer nights, but nothing near so loud, or long continued. Though I have watched for him warily in that and other places, after having, to the end of May, contributed to the myriads of my amusements, I never saw him more.”\*

It may be interesting to our country readers to be informed, that this pretty animal, one of the smallest and most beautiful of British quadrupeds, is widely diffused, and by no means so rare as to preclude the probability of its pleasing manners coming under the notice of our young field-naturalists. It has been ascertained, since its re-discovery by Mr. Dovaston, to be a native of several of the southern, midland, and northern counties of England, and even of Scotland. Mr. Bell has received it from Hertfordshire, from Devonshire, and from the river Lea, in Essex.

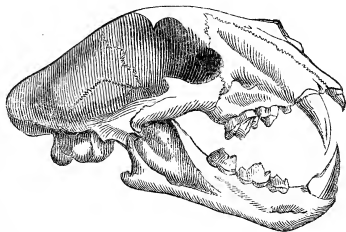
The zoologist just named informs us that the Water Shrew is attacked by the Weasel, which even follows it into the water, where, however, it readily saves itself by diving.

\* Mag. Nat. Hist. ii. 219.

## ORDER IV. CARNIVORA.

*(Flesh-eating Animals.)*

The food of the preceding orders, though not procured without the destruction of animal life, is yet obtained, almost entirely, from the invertebrate classes, Insects and Worms. For the capture and conquest of these no great vigour is required, and hence we have seen the animals to be small in size, and comparatively feeble in the organization necessary for the destruction of life. In this Order, however, to use the words of one of the greatest zoologists, "the sanguinary appetite is combined with the force necessary for its gratification. There are always four stout and long separated canines, between which are six incisors to each jaw. The molars are either wholly cutting, or have some



SKULL OF TIGER.

blunted tuberculous parts, but are never studded with sharp conical projections." \*

\* Cuvier.

All the families of the order do not, however, possess the carnivorous appetite, or the destructive power, in the same degree. The character of the molar teeth indicates, with the utmost precision, the extent to which the flesh-eating propensity exists in any animal of this order. In the Cats (*Felidæ*) the most typical of all CARNIVORA, the molars terminate at their summits in triangular lobes, the edges of which cut like lancets; and they have but one small tuberculous tooth on each side, and that only in the upper jaw. On the other hand, the Bears (*Ursidæ*), most of which feed largely on vegetable substances, have nearly all the molar teeth tuberculated. Yet from one of these extremes to the other, there runs a series of modifications forming an almost uninterrupted chain.

The present order is one of great extent; and its numerous species are widely distributed over both continents. Among those which inhabit tropical regions, are found the most ferocious and most formidable of quadrupeds. It comprises six families, *Ursidæ*, *Musteladæ*, *Felidæ*, *Viverradæ*, *Canidæ*, and *Phocadæ*.

## FAMILY I. URSIDÆ.

(Bears.)

In the slowness and nocturnal habits of the Bears, we recognise their affinity to the last order; and no less in the fact that most of the species which inhabit cold and temperate climates, pass the winter in a state of torpid insensibility. They lay the whole sole of the foot on the ground in walking, which gives them a heavy shuffling gait,

but admits of the body being reared up with facility, and sustained in an erect attitude. In this posture the fore paws are frequently used in defence, to strike, or to hug an assailant to death by muscular pressure. The whole sole is naked. The feet have five toes each, armed with strong, curved, somewhat obtuse claws, formed for digging: the grinding teeth are more or less tuberculated, and the food is either animal or vegetable; the form is generally robust. The genera inhabit both continents.

### GENUS *URSUS*. (LINN.)

Linnæus was acquainted with but one species of Bear, but above a dozen have now received specific names, though some of these may be found to be varieties. The dentition of the genus is thus expressed:—inc.  $\frac{6}{6}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{6-6}{7-7} = 42$ . The canines are strong, conical, and incurved; the molars have flattened crowns, surmounted with tubercles fitted for bruising vegetables, rather than for cutting flesh. The limited power which is possessed of performing the latter, lies in the incisors. Their claws, though large, strong, and sufficiently formidable, are yet suited better for digging, or for climbing trees, than for tearing prey. The tail is so short as to be for the most part hidden in the long shaggy coarse hair with which the body is clothed. They are animals of large size, of robust, and even clumsy form, and of sluggish habits. With the exception of two or three species, as the Grizzly Bear (*U. ferox*, LEWIS) of the Rocky Mountains, the Polar Bear (*U. maritimus*, ERXL.) and perhaps the Bear of Lebanon (*U. Syriacus*, EHRENB.), the species are

little disposed, if unmolested, to attack a man. Of the great strength and ferocity of the first two of these, however, many accounts have been narrated.

The Bears are almost confined to the northern hemisphere, but some are peculiar to India, and one is found beneath the equator, in the great island of Borneo.

The Brown Bear (*U. arctos*, LINN.) is familiar to nearly every one in this country, of which in former ages it was a native. Throughout the northern parts of continental Europe, and in the mountain forests of the central and southern districts, it is still very numerous. It extends also into the dreary regions of Asiatic Russia. Unsocial and solitary, haunting the most gloomy and secluded forests, he associates with his mate only for a very brief period, and on the approach of winter, retires into some cave, or hollow beneath the roots of a prostrate tree. The snows soon envelop him on all sides, and form a protection against the inclemency of the external cold, while his breath keeps open an orifice sufficiently large to supply him with fresh air. He is always very fat at the time of his retirement; and it is by the slow absorption of this accumulated nutriment, that he is supposed to supply the languid requirements of nature, through his long lethargy. On the other hand, the American Bears are stated, on the authority of Dr. Richardson, to leave their winter retreats as fat as they retired, but to become quite lean in the first few days of resumed activity.

The female brings forth her cubs, usually two in number, in her winter concealment: they are born blind, and do not open their eyes for thirty

days. A Bear's cub is not more "shapeless" than the young of other animals.

The strength of the Bear is prodigious. Mr. Nilsson states that one has been seen in Sweden, carrying a dead horse in his fore paws, as he marched on his hind feet, along the trunk of a fallen tree that crossed a river. Instances have been known of Bears climbing on the roofs of cow-houses, and having torn open the roof to gain admittance, killing the cattle, which they then managed to drag through the hole in the low roof, and carry away. Notwithstanding his great weight, he climbs trees with ease; and the feats of captive individuals, in this way, constitute not the least amusing exhibitions afforded to the visitors of our modern zoological gardens.

The flesh of the Bear is eaten; the tongues, paws, and hams, are even esteemed delicacies; the fat is in request with the perfumers; and the skin with the hair on, is valued as a carriage-covering in winter travelling, especially in northern countries. The Brown Bear sometimes exceeds seven hundred pounds in weight.

## FAMILY II. MUSTELADÆ.

(*Weasels.*)

Contrasting with the huge and uncouth forms of the animals we have just dismissed, the family now to be considered present, in their typical forms, the minute dimensions of the *Insectivora*. Very far from resembling them, however, in their feebleness, the *Musteladæ* are marked by carnivorous propensities and powers in a high state of

development; their ferocity and destructiveness, being but little inferior to what we find in the most sanguinary *Felidæ*. Their limbs are short, yet they possess much agility, to which the form of their bodies contributes; being very long and slender, they are able to insinuate themselves into narrow holes after their prey, and to throw their bodies into the most lithe contortions, when held. They do not burrow, nor do they become torpid in winter. Though the heel is raised from the ground, the sole is still much inclined: there is only one tuberculous molar behind the upper carnivorous tooth. Most of them exhale when alarmed, a powerful odour; so insufferable, in the case of some of the foreign genera (as *Mephitis* and *Mydaus*) as to produce fainting in those who are near.

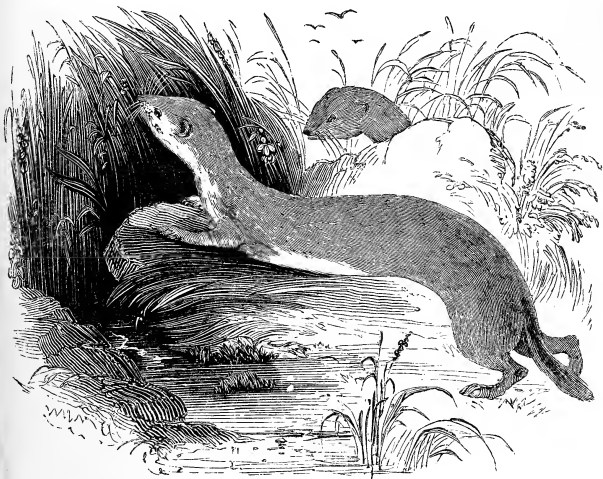
### GENUS *MUSTELA*. (LINN.)

The Weasels proper possess in an eminent degree the characters enumerated above as distinguishing the Family. The neck and body are of great length and tenuity, whence they are called *vermiform*, or worm-shaped; while the legs and feet are short and small. The toes are not united by a web, as they are in the Otters (*Lutra*); the claws are sharp; and the tongue is roughened. The dentition is as follows: inc.  $\frac{6}{6}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{4-4}{3-3}=34$ .

We have three native, and one domesticated species of *Mustela* in this country, the common Weasel, the Stoat or Ermine, the Polecat, and the Ferret. Of these we select the first-named (*M. vulgaris*, LINN.) to illustrate the economy and manners of the genus. The male is about eight inches in length exclusive of the tail, which is

about one-fourth as much more; the female is considerably smaller. The general colour is a light reddish brown; that of the under parts is white.

The prey of the Weasel consists of any animals that it can master, some of these being much larger than itself, as the house-rats, and voles. It climbs trees in search of birds' nests, sucking the eggs or destroying the young. The chickens from the hen-roost, newly hatched pheasants and partridges, ducklings, and young rabbits, all occasionally furnish a bill of fare for the Weasel. But



WEASEL.

mice and voles of all species, with moles and other small animals usually accounted vermin, are its ordinary prey. When attacked, however, it de-

fends itself with courage and ferocity, from birds of prey, from dogs, and even from man himself.

Weasels pursue their prey with much pertinacity ; hunting not only by the eye, but also by the scent. “Most amusing it is to see one of these flexible, agile little creatures tracing up the scent when it is at fault. They will quarter the ground like a dog till they hit it off, and to lose no help from their eye, will occasionally sit up, raising themselves on their hind quarters to gain a more extended view around them. Their perseverance will tire down animals larger and stronger than themselves ; nor will water stop them when their game takes to it for safety. In they plunge, and seldom quit their object till the fatal bite is inflicted.”\*

It is commonly supposed that the blood of the victim is the most agreeable part of the repast ; but this is not borne out by observation. The brain seems to be the favourite morsel ; and it is by a single bite through the skull piercing the brain, that death is ordinarily inflicted.

### FAMILY III. FELIDÆ.

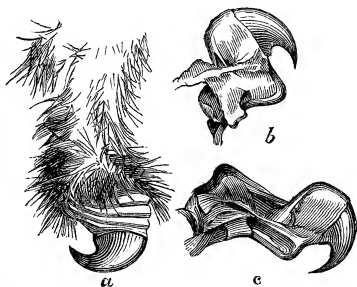
(*Cats.*)

The Cats are the most eminently carnivorous of *Mammalia*. The body is light and agile ; the spine is flexible ; the limbs muscular but capable of free, rapid, and energetic motion ; the toes armed with strongly curved and pointed talons, whose acuteness is preserved by a curious structure ; the short and rounded skull is beset with

\* Pen. Cycl. Art. WEASELS.

bony projections for the attachment of powerful muscles; the jaws, short, and of great strength, are furnished with few teeth, but of the most trenchant and formidable character, the motive power of which is confined to a vertical cutting action; and the tongue is covered, particularly at its anterior portion, with numerous horny points (*papillæ*) directed backwards in close array, which enable the animal to rasp off, as it were, portions of the flesh on which it is feeding, and to expose fresh series of blood-vessels, as well as to scrape off all particles of muscle from the bones.

The mechanism by which the points of the claws are preserved from injury is beautifully effective.



*a.* TOE OF LION, with the claw extended.

*b, c.* The same, without the skin, retracted and extended.

Every one is aware, who has handled the velvet paw of a cat, that in its ordinary condition the talons are quite concealed, but that in excitement they are forcibly thrown forward. The last joint of each toe, the tip of which is encased by the claw, is, in rest, drawn back either upon, or at the side of, the preceding joint, by the force of two

elastic ligaments. From this position it is in an instant extended by the contraction of a muscle beneath the toe, the tendon of which passes under the head of the last joint, as under a pulley, and is attached to the base of the claws. When the contraction ceases, the claw again springs back to its place, and lies concealed in a deep fold of the skin.

The noiseless step of the cat, by which it is enabled to steal unperceived on its victim, is no doubt owing in part to the retractation of the claws; but this is much aided by the spongy pads which are seen beneath the toes. These serve also by their elasticity to break the shock which otherwise would accrue to the nervous system in those vigorous bounds with which the *Felidæ* ordinarily spring upon their unsuspecting prey.

In conformity with all these indications, the natural food of the *Felidæ* is exclusively animal; the warm and quivering flesh, and gushing blood of creatures struck down and slain by sudden violence. The herbivorous *Mammalia* constitute the chief supply of the larger species; which do not, however, hunt or pursue the prey, as the *Canidæ* do, nor associate in packs, but lie in wait, at the spots to which the unthinking animals are known to resort, as the ponds and river margins in tropical countries, whence they pounce upon them with an irresistible force, and with one stroke of the fore paw fell them to the ground. The smaller species prey extensively on birds, small monkeys, and *rodentia*, and are expert and agile climbers of trees.

The Family is spread over the whole globe, with the exception of Australia and the Arctic Re-

gions; in the hotter parts of the world, the species are very numerous, and many of them attain great size and power. The Lion, the Tiger, and the Jaguar are the most formidable of the bestial enemies of man.

### GENUS *FELIS*. (LINN.)

As the large Family before us contains but one satisfactorily established genus, its distinctive characters are those already enumerated. The dental system is thus expressed:—inc.  $\frac{6}{6}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{4-4}{3-3}=30$ .

Though the great Cats of the tropics, as the Lions, the Tigers, and the Leopards, afford many points of interest, and though from their size, power, and ferocity, and the beauty of many of them, their history is always attractive, we purpose, in conformity with our design to illustrate this work as much as possible by species indigenous to or naturalized in the British Islands, to select the common domestic Cat, as the example of this the most typical group of carnivorous quadrupeds.

There is a species of wild Cat (*Felis catus*, LINN.) common in the forests of Europe, and still found in some numbers in the northern parts of this country, of formidable strength and ferocity; and for a long time, our common Cat was believed to be this species in domestication. For many important reasons this opinion has been relinquished by modern naturalists, and the origin of this favourite animal has been sought elsewhere. It is an interesting fact, that, at a very early period, a domestic Cat was in the possession of the Egyptians, and, from their paintings and sculptures, we

learn that they trained it to assist in fowling among the papyrus reeds of the river margins. There is a Cat found wild in Nubia, which agrees in many particulars with these representations, with the mummies of Egyptian Cats, and with our domestic species; and hence many zoologists incline to consider this Nubian Cat (*Felis maniculata*, TEMM.) as the original of the tame breeds. It is worth remarking, however, that the cats of the Egyptian pictures, in their robust form, short ears, and short legs, as well as in their decidedly brindled or tabby pattern of colouring, agree better with our own common breeds than with the *maniculata*;



EGYPTIAN FOWLING-SCENE.

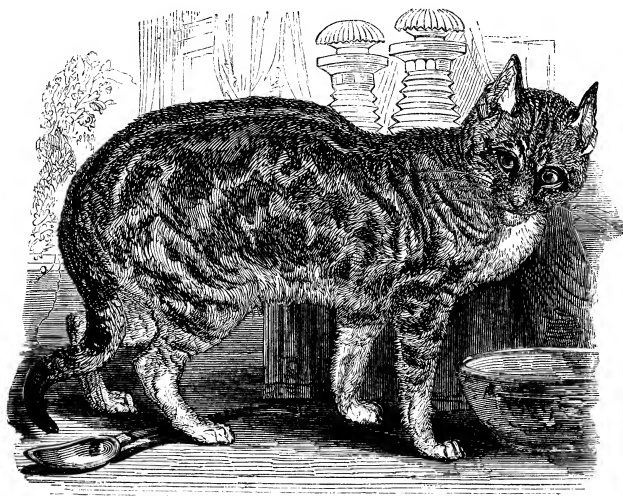
as may be seen by a reference to an original painting of a fowling scene in the Egyptian Saloon of

the British Museum, a copy of which we here present.

On such a subject we would give any judgment of our own with much deference, but it has long been our opinion that many animals were *created* in the condition which we call *domestication*, and were originally given by God to man, as his humble companions and assistants. If this was so, the absence of wild types of nearly all our domestic animals, is perfectly accountable, for they had no existence; and though in some cases, as in the Wild Ass, there are numerous wild individuals of apparently a domestic species, it seems to us not extravagant to consider them as having become accidentally emancipated from their original condition of servitude. And this may perhaps receive some confirmation from a very ancient notice of the animal just named. In the sublime reproof of Job, by the LORD out of the whirlwind, He asks, “Who hath *sent out* the wild ass *free*? or who hath *loosened the bands* of the wild ass?”\* We would then, in reference to the animal under consideration, suggest the probability that the *F. maniculata* is descended from the Egyptian domestic Cat, instead of being its original, and that its gaunt form is the natural result of its precarious mode of living in the deserts of Nubia. Our species we should regard as of the same lineage, but transmitted in that state of dependence in which it was originally possessed.

The chief utility of the Cat to man, is its habit of preying upon the rats and mice which infest our dwellings. A good mouser will follow up the pursuit of these pests, with a sort of *professional*

*gusto*, quite independent of the promptings of hunger, watching at their holes with untiring pertinacity, and having pounced upon her prey, will often bring it and lay it down at the feet of some one whose affection she values, with a little cry of complacency. It is, however, very frequently kept as a pet, and loved for its own sake, though there may be no mice to be destroyed. The Cat's susceptibility of kindly affections has been



DOMESTIC CAT.

much underrated. Instances occur continually of Cats willingly accompanying a family removing their residence, and becoming at home at once, without manifesting any desire to return to the former dwelling; plainly evincing that the

love of persons in such cases is stronger than that of places. It is recorded that when the Earl of Southampton was committed to the Tower for high treason in the reign of Elizabeth, a favourite Cat found her way into her loved master's society, by descending the chimney of his prison.

In the family of a friend of ours, one of the children had a kitten given him, when quite an infant. It soon became his pet, and he was accustomed to fondle it continually, delighting to lie down on the hearthrug, and roll about with the Cat in his embrace. As it grew up, the animal manifested a very spiteful disposition to every member of the family, except Johnny its little patron; to such a degree, that, if the lady of the house but touched it accidentally with her foot in the slightest way, it would instantly snarl like an angry dog, and snap at her. To Johnny, however, it was always affectionate, seeking and delighting in his society. One day, when about six years old, he was playing on the floor with a brother a little older, and in the height of his romps screamed out; the Cat, who had appeared perfectly inattentive to their game, on hearing her favourite's scream, suddenly flew at the brother with the utmost virulence, and would doubtless have done what mischief she could, had not Johnny come to the rescue, by whom she suffered herself to be removed.

Mr. Jesse, among many interesting anecdotes of animals, in his "Gleanings in Natural History," records the following instance of faithful zeal in a Cat. "Cats have been known also to do their best to protect the property of their masters, as well as dogs. A man who was sentenced to transportation for a robbery, informed me, after his

conviction, that he and two others broke into the house of a gentleman near Hampton Court. While they were in the act of plundering it, a large black Cat flew at one of the robbers, and fixed her claws on each side of his face. He added, that he never saw any man so much frightened in his life." \*

We know not whether we should attribute to the force of personal or local attachment, the incident recorded in the following anecdote, by the same amiable author, which, marvellous as it is, he assures us, needs not be doubted. "A lady, residing at Glasgow, had a handsome Cat sent to her from Edinburgh; it was conveyed to her in a close basket, and in a carriage. The animal was carefully watched for two months; but, having produced a pair of young ones at the end of that time, she was left to her own discretion, which she very soon employed in disappearing with both her kittens. The lady at Glasgow wrote to her friend at Edinburgh, deploring her loss; and the Cat was supposed to have formed some new attachment. About a fortnight, however, after her disappearance from Glasgow, her well-known *mew* was heard at the street-door of her Edinburgh mistress, and there she was with both her kittens; they in the best state, but she herself very thin. It is clear that she could only carry one kitten at a time. The distance from Glasgow to Edinburgh is forty-four miles, so that if she brought one kitten part of the way, and then went back for the other, and thus conveyed them alternately, she must have travelled one hundred and twenty miles, at least. She must also have

\* Gleanings, p. 319.

journeyed only during the night, and must have resorted to many other precautions for the safety of her young." \*

The Cat is an affectionate mother; so jealously careful of the comfort of her young, that she will remove and hide them, if they are too much handled, or even inspected, particularly by strangers. Yet she will often bring them in succession in her mouth, and present them to the persons with whom she is familiar, evidently desiring their sympathy with her admiration of them. The playfulness of kittens is excessive: and it is hardly possible to observe their innocent gambols without a feeling of complacent gratification.

#### FAMILY IV. VIVERRADÆ.

(*Civets.*)

We find animals in this Family which recede from the eminently typical character of the last described, though in general form and appearance they retain a certain resemblance to the Cats, particularly in the prevalence of stripes or spots upon the thick fur with which they are clothed, and in their long tails marked with bars of alternate hues. They have three false molars above, and four below, the anterior of which sometimes fall out; two tolerably large tuberculous teeth above, one only below, and two tubercles projecting forwards on the inner side of the lower carnivorous tooth, the rest of that tooth being tuberculous. The tongue is beset with sharp and rough *papillæ*, as in the Cats. The claws, for the most part, are

\* Gleanings, p. 294.

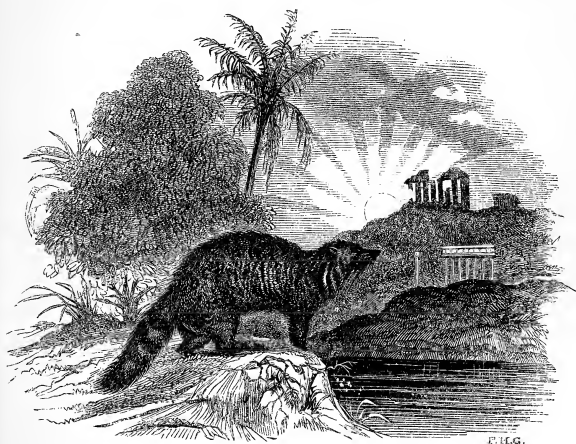
not sheathed, but are raised from the ground, as the animals walk. At the hinder part of the body is a membranous pouch, in which peculiar glands secrete an unctuous substance, which in many species is powerfully odorous, and was formerly much esteemed in perfumery.

The animals of this Family are of rather small size; the muzzle is pointed; the body lengthened; the limbs usually short; the fur thick; the tail usually long, often bushy. In form, they remind us of some of the larger *Musteladæ*, and also of the *Racoons*. They vary much in the intensity of their carnivorous appetite, some genera being little behind the *Felidæ*, while others subsist largely on a fruit diet. They are confined to the warmer regions of the Old World.

#### GENUS *VIVERRA*. (CUV.)

The true Civets approach very closely the Cats, in many of their characters, as well as in their sanguinary appetites, and their nocturnal and predatory habits. Their dental system is thus arranged: inc.  $\frac{6}{6}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{6-6}{6-6} = 40$ . The scent-pouch is double; the secretion copious and odoriferous; the pupil of the eye remains round in contracting; the claws are half retractile. A loose mane, capable of erection, runs along the back, more or less conspicuously; when the animal is irritated, it sets up this mane and hisses in the manner of a cat. Four species are described; inhabiting Africa, India, and the great islands adjacent: they are indolent by day, but roam at night, and prey much on birds and small quadrupeds.

The Civet of North Africa (*Viverra civetta*, LINN.) is about as large as a Badger, but of more graceful proportions; its colour is grey, hand-



CIVET.

somely, but irregularly striped and spotted with black; the tail, which is bushy, is ringed and tipped with black. The unctuous perfume, called civet, so much valued still in the East, and formerly in vogue in Europe, is the produce of this species; and to obtain it great numbers are domesticated. Father Poncelet affirms that he has seen as many as three hundred in the possession of one merchant. In Buffon's time, many were imported into Holland for the same object. The civet is procured by scraping the inside of the pouch with an iron spatula, twice a week. If the animal is in good condition, and especially if it

has been irritated, about a dram is collected at a time. The female, however, produces less. If it be not collected, it will drop in small pieces, about the size of a nut. Though readily tamed, the temper of the Civet is irritable, and not to be trusted.

## FAMILY V. CANIDÆ.

(Dogs.)

Through the Hyænas, which seem to belong to the *Viverradæ*, we are connected with the familiar animals of the present group. The Dogs have a more or less lengthened muzzle; the bony palate terminates in a line with the hinder margins of the posterior molar teeth; they have two flat tuberculous molars behind the carnivorous tooth. They do not attain the size of the greater Cats, but exceed that of the Civets: the legs are long, and hence the stature is elevated. Though carnivorous, their ferocity is not, generally, equal to their strength; they obtain their prey, not by a sudden bound, but by hunting it down, by the aid either of sight or smell, often associating in packs for this purpose. They are not averse to carrion. The species, under the names of Dogs, Wolves, Foxes, and Jackals, are widely scattered.

## GENUS *CANIS*. (LINN.)

The generic characters of the Dog, including also the Wolf, are as follows. Teeth: inc.  $\frac{6}{6}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{6-6}{7-7}$ : = 42. Tongue smooth; pupils of the eyes circular; fore feet with five toes; hind feet with four, and sometimes a fifth, at some distance from the ground; claws not retractile.

The domestic Dog (*Canis familiaris*, LINN.) is probably the most valuable of all the bestial servants of man. The strength of the Elephant, the endurance of the Camel, the swiftness and docility of the Horse, the fleecy covering of the Sheep, and the patient labour of the Ox, are all exceedingly useful gifts bestowed by our gracious Creator; but all of these are circumscribed in their sphere of service, and by none are their whole faculties and powers rendered up with that fulness and freedom, that ungrudging love, with which the Dog delights to serve. The Horse does not draw the chariot, nor the Ox drag the plough, of his own choice; but the Dog finds his highest gratification in fulfilling and even anticipating the desires of his master. "The whole species," observes Cuvier, "has become the property of man; each individual is devoted to its particular master, assumes his manners, knows and defends his property, and remains attached to him until death; and all this, neither from constraint nor want, but solely from gratitude and pure friendship. The swiftness, strength, and scent of the Dog, have rendered him a powerful ally to man against other animals; and were even, perhaps, necessary to the establishment of society. It is the only animal which has followed man all over the world."

Another zoologist\* speaks of the Dog as "an animal given to man to be his assistant and friend. To his service is the Dog devoted; by him are its very instincts modified; to him it looks up for encouragement, and his good word or kind caress throws it into a rapture of delight. The Dog

\* W. C. L. Martin, "Hist. of the Dog," p. 221.

enjoys to walk out with its master: it listens for his footstep, it whines in his absence, and it greets his return. Fidelity, courage, and intelligence are its attributes. It is the only animal which, from a spontaneous impulse, allies itself to the human race, shares with equal devotion the cottage of the peasant and the palace of the noble; and claims a return of the attachment it manifests, a return which every well-ordered mind will willingly accord."

The varieties of the domestic Dog are very numerous, and, as crosses of breeds comparatively pure are continually taking place, the production of mongrel-races becomes endless. Many attempts to classify the various known breeds have been made, of which we give one of the most recent, by the zoologist last quoted; which is curious, at least, as an enumeration of the well-marked varieties. Mr. Martin excludes the Dingo of Australia, and what he considers as "the true wild Dogs of India."

"1. Ears erect, or nearly so; nose pointed; hair long, often woolly; form robust and muscular; aspect more or less wolfish.

Feral \* dog of Russia.  
 Feral dog of Natolia.  
 Shepherd's dog of Natolia.  
 Persian guard-dog.  
 Pomeranian dog.  
 Icelandic dog.  
 Siberian dog.  
 Tschutschi dog.  
 Esquimaux dog.  
 Hare-Indian dog.  
 Black wolf-dog of Florida Indians.  
 Nootka dog.  
 Shepherd's dog.

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\* Feral; *i. e.* wild, not by original condition, but by escape from domestication.

- |   |   |                                  |
|---|---|----------------------------------|
|   |   | Ancient German boar-hound.       |
|   |   | Great Danish dog.                |
|   |   | Feral dog of Hayti.              |
|   |   | French mâtin.                    |
| 2. Ears narrow, semi-erect, or only slightly pendulous ; muzzle produced ; jaws strong ; hair smooth or wiry ; limbs long and vigorous : power of scent not highly developed. | { | Irish wolf-dog.                  |
|   |   | Scotch deer-hound.               |
|   |   | English grey-hound.              |
|   |   | Italian grey-hound.              |
|   |   | Persian grey-hound.              |
|   |   | Brinjaree dog.                   |
|   |   | Albanian grey-hound.             |
|   |   | Lurcher.                         |
| 3. Ears moderately large and pendent ; muzzle deep and strong ; hair long, sometimes wiry ; form robust ; aspect grave and intelligent.                                       | { | Italian wolf-dog.                |
|   |   | Newfoundland dog.                |
|   |   | Labrador dog.                    |
|   |   | Alpine dog.                      |
| 4. Ears moderately large ; sometimes very large ; pendent ; hair long and fine ; muzzle moderate ; forehead developed ; scent acute ; intelligence at a high ratio.           | { | Spaniel and fancy varieties.     |
|   |   | Water-spaniel and varieties.     |
|   |   | Rough water-dog, or Barbet.      |
|   |   | Little Barbet.                   |
|   |   | Setter.                          |
|   |   | Pointer.                         |
| 5. Ears large, pendent ; muzzle long and deep ; nose large ; hair close ; scent acute ; form vigorous.  | { | Dalmatian dog.                   |
|   |   | Beagle.                          |
|   |   | Harrier.                         |
|   |   | Fox-hound.                       |
|   |   | Old English hound.               |
|   |   | Blood hound.                     |
|   |   | African hound, &c.               |
| 6. Ears moderate, pendent ; muzzle short and thick ; jaws enormously strong ; hair short, sometimes wiry ; form robust ; sense of smell variable.                             | { | Cuban mastiff.                   |
|   |   | English mastiff.                 |
|   |   | Thibet mastiff.                  |
|   |   | Ban-dog.                         |
|   |   | Bull-dog.                        |
|   |   | Corsican and Spanish bull-dog.   |
|   |   | Pug-dog.                         |
| 7. Ears sub-erect ; muzzle rather acute ; jaws strong ; hair short or wiry ; scent acute ; habits active ; intelligence considerable.   | { | Terrier, smooth and wire-haired. |
|   |   | Turnspit.                        |
|   |   | Barbary dog."                    |

Anecdotes of the docility, sagacity, memory, courage, faithfulness, and love of the Dog, are

sufficiently numerous to fill volumes. A few of these we subjoin. The repetition may serve to inculcate a kindly regard for the comfort of an animal whose faculties are of so high an order, and so entirely devoted to man.

The Shepherd's Dog perhaps excels all others in intelligence, thoughtfulness, and promptitude.



SHEPHERD'S DOG.

On the trackless downs of Wiltshire, or the wild moors of Lancashire and Scotland, the flocks could not be kept together but for the aid of this faithful and ready-witted assistant. Who has not seen with admiration the ease with which a Colley will guide a flock through the mazy streets of London, to or from Smithfield, amidst passengers,

vehicles, and cattle, and even through other flocks, without suffering one to lag behind or to wander? Mr. Hogg himself communicated the following anecdote to Mr. Jesse. "During the time in which Lambs are weaned, the Ettrick Shepherd had seven hundred of them under his care. As is sometimes the case, especially at that time, they broke away in the middle of the night, and scampered off in three different parties across the hills, in spite of all the shepherd and his assistant could do to keep them together. 'Sirrah,' cried the shepherd, in great affliction, (addressing his dog,) 'Sirrah, my man, they're a' awa.' The night was so dark that he did not see the dog, but the faithful animal had heard his master's words, and without more ado he silently set off in quest of the flock. Meanwhile, the shepherd and his companion spent the night in scouring the hills for miles round, but could see nothing of the flock or the dog. On their way home in the morning, they discovered a body of lambs at the bottom of a deep ravine called the Flesh Cleuch, and the dog standing in front of them, looking all around for some relief, but still standing true to his charge. Not one lamb of the whole flock was wanting."\*

In the transport of flocks from distant parts of the country to market, the sagacity and memory of this dog is invaluable. "A shepherd employed to bring up some mountain-sheep from Westmoreland, took with him a young sheep-dog, who had never made the journey before, and, from his assistant being ignorant of the ground, the man experienced great difficulty in having the flock stopped at the various roads and lanes. Next

\* Gleanings, p. 152.

year this shepherd, accompanied by the same dog, brought up another flock. On being questioned how he had got on, he said, much better than the year before, as his dog *now knew the road*, and had kept the sheep from going up any of the lanes or turnings which had given him so much trouble in his former journey. The distance was not less than four hundred miles.”\*

Mr. Darwin has described in an amusing manner the sheep-dogs of the plains of South America, to whom the unassisted care of the flocks is devolved, and whose courage is exercised only by the stimulus of their charge. “When riding, it is a common thing to meet a large flock of sheep, guarded by one or two dogs, at the distance of some miles from any house or man. I often wondered how so firm a friendship had been established. The method of education consists in separating the puppy, when very young, from the bitch, and in accustoming it to its future companions. An ewe is held three or four times a day for the little thing to suck, and a nest of wool is made for it in the sheep-pen. At no time is it allowed to associate with other dogs, or with the children of the family. . . . From this education it has no wish to leave the flock, and just as another dog will defend its master, so will these the sheep. It is amusing to observe, when approaching a flock, how the dog immediately advances barking,—and the sheep all close in his rear as if round the oldest ram. These dogs are also easily taught to bring home the flock at a certain time in the evening. . . . The shepherd-dog comes to the house every day for some meat,

\* Gleanings, p. 49.

and immediately it is given him he skulks away as if ashamed of himself. On these occasions the house-dogs are very tyrannical, and the least of them will attack and pursue the stranger. The minute, however, the latter has reached the flock, he turns round and begins to bark, and then all the house-dogs take very quickly to their heels. In a similar manner a whole pack of the hungry wild dogs will scarcely ever (and I was told by some, never) venture to attack a flock guarded even by one of these faithful shepherds.”\*

The following, which we extract from the *Times* newspaper of August 26th, 1847, quoted from an Edinburgh paper, illustrates the kindness of the shepherd's dog in contrast with the cruelty of man, so as to justify the question with which the article is introduced: “WHICH IS THE BRUTE? An instance of animal sagacity and *humanity*, unequalled in our remembrance, took place before our door lately. An unfortunate dog, in order to make sport for some fools, had a pan tied to his tail, and was sent off on his travels towards Galt. He reached the village utterly exhausted, and lay down before the steps of Mr. Young's tavern, eyeing most anxiously the horrid annoyance hung behind him, but unable to move a step farther to rid himself of the torment. Another dog, a Scotch colley, came up at the same time, and, seeing the distress of his crony, laid himself gently down beside him, and gaining his confidence by a few caresses, proceeded to gnaw the string by which the noisy appendage was attached to his friend's tail, and with about a quarter of an hour's exertion, severed the cord, and started to his legs, with the pan hanging

\* Darwin's Journal.

from the string in his mouth, and, after a few joyful capers around his friend, departed on his travels in the highest glee at his success."

That the faculty of measuring the succession of time belongs to the dog, appears to be proved by many recorded incidents. Mr. Bell mentions a Newfoundland dog, kept at an inn in Dorsetshire, which "was accustomed every morning as the clock struck eight, to take in his mouth a certain basket, placed for the purpose, and containing a few pence, and to carry it across the street to a baker's, who took out the money, and replaced it by a certain number of rolls. With these Neptune hastened back to the kitchen, and safely deposited his trust; but, what was well worthy of remark, he never attempted to take the basket, or even to approach it on Sunday mornings."\*

Mr. Jesse adduces an instance of the accurate measurement of a much longer period. "There were two friends, one living in London, and the other at Guildford. These friends were on terms of great intimacy; and for many years it had been the custom for the London family to pass the Christmas at Guildford; and their uniform practice was to arrive to dinner the day before Christmas day, and to be accompanied by a large spaniel, who was as great a favourite with the *visited* as with the visitors. At the end of about seven years after this plan had been adhered to, the two families had an unfortunate misunderstanding, which occasioned an omission of the usual Christmas invitation. About an hour before dinner on the day before Christmas day, the Guildford gentleman, standing at his window, exclaimed to his

\* Brit. Quad. p. 244.

wife, ‘ Well, my dear, the W——s have thought better of it, for I declare they are coming as usual, though we did not invite them ; here comes Cæsar to announce them :’ and the dog came trotting up to the door, and was admitted as usual to the parlour. The lady of the house gave orders to prepare beds, dinner waited an hour, but no guests arrived. Cæsar, after staying the exact number of days he had been accustomed to, set off for home, and reached it in safety. The correspondence which of necessity occurred, had the happy effect of renewing the intercourse of the estranged friends, and as long as Cæsar lived, he paid the annual visit in company with his master and mistress.”\*

Accounts have been published, apparently veracious, of dogs which had been taught to articulate words. Much more indubitable is the fact that they understand the meaning of spoken language. Dr. Gall observes, “ I have often spoken intentionally of objects which might interest my dog, taking care not to mention his name, or make any intonation or gesture which might awaken his attention. He, however, showed no less pleasure or sorrow, as it might be ; and indeed, manifested by his behaviour, that he had perfectly understood the conversation which concerned him. I had taken a bitch from Vienna to Paris ; in a very short time she comprehended French as well as German, of which I satisfied myself by repeating before her whole sentences in both languages.†” Mr. Martin gives the following example of the same faculty :—“ We have two dogs, a spaniel and a terrier, both of small size ; and if, by way of

\* Gleanings, p. 168.

† “ Sur les Functions du Cerveau.”

trial, in the course of conversation, we say, in the ordinary tone of voice, and without looking at them, ‘I am sure there must be a cat somewhere about the house,’ they are instantly excited, and search in every place for the animal, to which they bear instinctive hatred.”\*

More curious still is the following anecdote:—“Lord Combermere’s mother (Lady Cotton,) had a terrier named Viper, whose memory was so retentive that it was only necessary to repeat to him once the name of any of the numerous visitors at Combermere, and he never afterwards forgot it. Mrs. H. came on a visit there on a Saturday. Lady Combermere took the dog up in her arms, and going up to Mrs. H. said, ‘Viper, this is Mrs. H.’ She then took him to another newly arrived lady, and said, ‘Viper, this is Mrs. B.,’ and no further notice was taken. Next morning, when they went to church, Viper was of the party. Lady Cotton put a prayer-book in his mouth, and told him to take it to Mrs. H., which he did, and he then carried one to Mrs. B., at his mistress’s order.”†

Far more interesting than the docility by which the dog acquires by practice the power of doing certain strange and unexpected things, is a sort of inherent nobleness of character, and what we can scarcely refrain from calling moral excellence, which we see in many varieties. Anecdotes of devoted attachment and faithfulness in dogs are perhaps more common than many others; but these qualities sometimes assume unusual phases. How delicately chivalrous must have been the feelings of the animal thus alluded to:—“A gen-

\* The Dog, p. 99.

† Gleanings, p. 163.

tleman had a remarkably fine Newfoundland dog, so innately gallant and polite, that unless ordered to remain at home, he invariably, unbidden, preceded his master's wife and sisters when they walked abroad, if they were unattended by a gentleman. He compelled every person he met,



NEWFOUNDLAND DOG.

by a significant look or growl, to make way for them, but when a gentleman accompanied them he always walked behind. When with him, by night or by day, they were safe, for his courage was equal to his sagacity, and on the slightest signal from them of alarm, he was ready to give battle.”\*

\* Gleanings, p. 151.

With the following touching example of faithful love even in death, and with Mr. Jesse's reflection thereon, we close our history of this most interesting of animals. "The following anecdote of faithful attachment was communicated to me by a gentleman well known as a diplomatist. He had a small terrier which was much attached to him. On leaving this country for America, he placed the dog under the care of his sister, who resided in London. The dog at first was inconsolable, and could scarcely be persuaded to eat anything. At the end of three years his owner returned, and upon knocking at the door of his sister's house, the dog knew his knock, ran down-stairs with the utmost eagerness, fondled his master with the greatest affection, and when he was in the sitting-room, the faithful animal jumped upon the piano-forte, that he might get as near to him as possible. The dog's attachment remained to the last moment of his life. He was taken ill, and was placed in his master's dressing-room, on one of his cloaks. When he could scarcely move, his kind protector met him endeavouring to crawl up-stairs. He took him up in his arms, placed him on his cloak, when the dog gave him a look of affection which could not be mistaken, and immediately died. There can be no doubt, I think, that this affectionate animal, in his endeavour to get up the steps to his master, was influenced by sensations of love and attachment which death alone could extinguish, and which the approach of death prompted him to shew. I delight in these testimonies of the affection of dogs to a kind master. They serve to prove what I have said elsewhere, that these animals were designed by an infinitely wise and good

Being to be the companions and friends of man, clinging to him under every circumstance of poverty and distress. Their attachment, fidelity, and sagacity, should protect them from that ill-usage to which they are so constantly subjected." \*

## FAMILY VI. PHOCADÆ.

(*Seals.*)

We now arrive at a group of carnivorous quadrupeds, whose structure is modified for a sphere of action and an economy almost exclusively aquatic. The anterior limbs, which in the Bats are enormously lengthened, are in the Seals reduced to extreme shortness, the bones being thick and compact. In both cases, however, the fingers are embraced in the integuments, and for a similar object, the production of a broad fanning surface, in the one instance to strike the air, in the other the water. The toes of the hind feet, which in these animals are directed backward, are connected by very wide membranes, so that they can be greatly dilated, and form very powerful oars. The paws are too short to be very effective instruments of terrestrial progression, but they assist the animal in climbing out of the water upon the rocks and masses of floating ice, on which it delights to bask in the sun. A singular sort of shuffling, jumping motion, of considerable quickness, is attained, however, on the land, by the vertical curving of the spine, assisted by the muscles of the trunk. The lengthened form of the body, which, owing to the narrowness of the

\* Gleanings, p. 161.

*pelvis*, tapers almost to a point; the broad webbed feet; the spongy lightness of the bones; and the short, close fur lying flat upon the skin, admirably adapt this Family for their ocean-life. They shoot through the water with almost the rapidity of fishes.

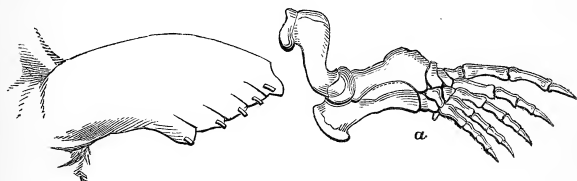
The physiognomy of the Seals is generally pleasing; the head is round, the muzzle short and fleshy; the eyes are large and dark, with a mild expression. The external ears are either very small, or altogether wanting; their orifices as well as those of the nostrils can be closed by muscular effort at the will of the animal. The Seals are scattered over the margins of all seas; but are most numerous in the Arctic and Antarctic oceans, where they constitute an object of commercial pursuit, from the value of their fur and their abundant surface-fat, which is melted into oil.

#### GENUS *PHOCA*. (LINN.)

The teeth of the common Seals are thus arranged: inc.  $\frac{6}{4}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{5-5}{5-5}$ : = 34. They are evidently formed, observes Mr. Bell, “for the purpose of seizing, holding, and partially dividing the scaly and slippery fish upon which the Seal feeds; the canines are strong, but acute; the molars beset with points of various size and form, but all adapted to their piscivorous habits; and the simple stomach is in perfect harmony with such a structure.”\* The form of the skull is flattened on the top, swelling at the sides; it has only slight roughnesses in the place of occipital crests. There are no visible ears.

\* Brit. Quad., p. 260.

“The paws of these animals, though expressly made for swimming, are not, it is evident, so truly paddle-like as those of the Whale or Porpoise: the anterior pair are plainly divided into strong toes, armed with nails and webbed: the posterior



FOOT OF THE SEAL. (a.) SKELETON OF THE SAME.

limbs are feeble; but the toes are still distinguishable, and serve as supports to a large extent of web, constituting an apparatus admirably adapted for propelling the animal through the water, and calling to mind the feet of the Diver (*Colymbus*) or Great Auk, (*Alca impennis*), both as to appearance and position.”\*

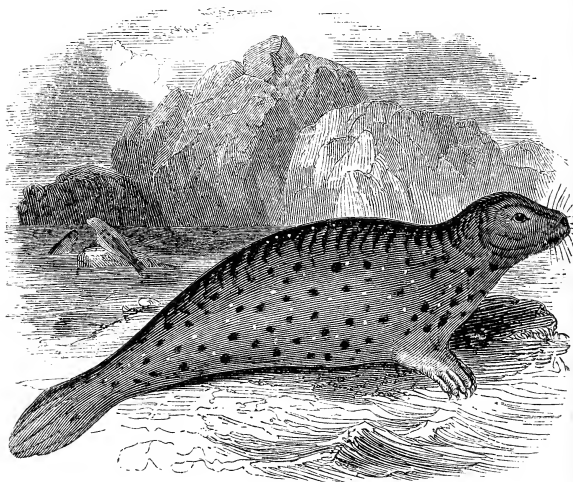
Several species of this genus inhabit the seas of our coasts, and are particularly abundant on the rocky shores of Scotland, and the west of Ireland. The most common is the variegated species, known vulgarly as the Sea-calf, (*Phoca vitulina*, LINN.) a name given to it from a fancied resemblance of its voice to the bleating of that animal.

The common Seal is four or five feet long; of a yellowish-grey hue, with dark spots on the back and sides. The body is plump and full, beautifully tapering; the head round, with a very short neck; from the thick upper lip project, on each side,

\* Martin's Hist. of Quad., p. 96.

many strong and stout bristles or whiskers, which probably serve as very susceptible organs of touch, as each bristle is supplied by a considerable nerve.

The intelligence and docility of the Seal are very great. M. Fred. Cuvier has given an account of one which performed many pleasing tricks at the command of its master, to whom it was much



SEAL.

attached. It manifests much curiosity, and appears to delight in musical sounds. Laing, in his account of a voyage to Spitzbergen, states that when the violin was played, a numerous audience of Seals would generally collect around the vessel, following her course for miles. Fishes constitute the prey of the Seal; in the pursuit of which it

displays much cunning and power of swimming. In the Scottish estuaries it destroys great quantities of salmon. It is itself the object of pursuit, for the sake of its skin and blubber. "The fishing commences in autumn, and is practised by means of nets, stretched across narrow sounds where the Seals are in the habit of swimming. In these nets they are entangled, but it is only the young that can be thus captured; the old ones are shot, or their recesses and caves are entered at night by boatmen with torches and bludgeons, upon which the animals, alarmed by the glare and the shouts of the men, rush tumultuously forward to sea, and as they push along in confusion and terror, they are knocked on the heads with clubs, the men being duly stationed for that purpose."\* The senses of this animal seem to be very acute, and hence much caution is requisite to secure them. Mr. Hogg, in a communication to Mr. Bell, observes, "I have often been out in a boat in the Tees estuary, endeavouring to shoot a Seal, but never could succeed; for the Seal, on seeing the flash occasioned by the flint and steel of the gun-lock, instantly dived."† It is destroyed by a comparatively slight blow on the forehead or muzzle.

\* Pictorial Museum, i. 222.

† Brit. Quad., 266.

## ORDER V. CETACEA.

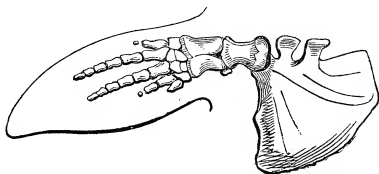
(Whales, &amp;c.)

It has been customary to place the animals of this Order at the conclusion of the series of *Mammalia*; some eminent zoologists, however, have preferred to fix them between the *Carnivora* and the *Pachydermata*, connected with the former through the Seals, and with the latter through the Manatees. This we believe to be their true position.

The *Cetacea* are exclusively aquatic: unlike the Seals, which occasionally crawl out of the water, and bask in the sun, upon the rocks, the Whales and Porpoises never leave the element in which they are born. Their external form is that of a fish, "in the horizontal elongation of the body, the rounded and smooth surface, the gradual attenuation of the extremities of the trunk, and the development of fins, and especially of the tail as means of progression."\* We saw in the Seals, the fore paws reduced to mere *flippers*, by the shortening of the bones of the limb, and by the envelopment of the fingers in the common integument. In the Order before us, the transformation is still more complete; the bones of the arm are still more shortened and flattened; those of the fingers, imbedded in *cellular tissue*, are so concealed beneath a thick skin, that all external trace of them disappears, there being even no claws to indicate their number. The limb has become a mere

\* Brit. Quad., 453.

paddle or oar, to be worked in a medium of great density, and hence the shoulder blade is of remarkable breadth, and the other bones solid and powerful.



FIN OF DOLPHIN.

The hind limbs we observed in the Seals placed very far behind, and forming two fan-shaped oars, whose direction was backward. In the Whales these limbs are altogether wanting (or are represented by one or two small *pelvic* bones, isolated in the flesh); but they are replaced by a broad cartilaginous fin at the extremity of the body, placed not vertically, as in the Fishes, but horizontally. This organ is the chief instrument of motion, which is mainly performed by alternate strokes upward and downward, rendered effective by its immense muscular power. In some of the larger Whales this caudal fin is upwards of twenty feet wide, and contains a hundred superficial feet.

The head is joined to the trunk without any contraction, so that the neck seems to be altogether wanting; the seven vertebræ, however, that belong to this part of the skeleton in all *Mammalia*, are present, but are so narrow, and so soldered together (*anchylosed*) as to appear like a

single bone of inconsiderable thickness. Several species have a perpendicular fin standing up from the back, but it is merely cartilaginous, and never supported by any bony processes from the spine.

The modification of the respiratory organs requisite for animals whose whole life is passed in the sea is not the least curious point in the economy of the *Cetacea*. Formed for breathing air alone, and therefore compelled to come to the surface at certain intervals, they yet remain immersed for periods which would prove fatal to any other air-breathing animals. The Whales can remain upwards of an hour beneath the surface. The object of breathing being to renew the vital qualities of the blood, by the absorption of oxygen from the air, it is manifest that if more blood could be oxygenised at once than is wanted for immediate use, and the overplus deposited in a reservoir until required, respiration could be dispensed with for a while. Creative wisdom has obviated the difficulty by this contrivance. The exhausted blood which is returned by the veins, having been renewed by communication with the air in the lungs, is carried to the heart, whence only a part is carried away into the system, the remainder being received into a great irregular reservoir, consisting of a complicated series of arteries, which first lines a large portion of the interior of the chest, then insinuating itself between the ribs, forms a large cushion outside of them near the spine, and also within the spinal tube, and even within the skull. The blood thus reserved is poured into the system as needed, and thus frequent recurrence to the atmosphere is dispensed with.

The windpipe does not terminate, as in other mammals, in nostrils at the extremity of the muzzle, but in an orifice at the very summit of the head, which, as the animal rises obliquely, is the first part that emerges from the surface, so that the admission of air to the lungs takes place without needless effort, or exposure of the body. The orifice, or orifices, for there are sometimes two, are called blow-holes, the expulsion of the long-imprisoned and heated air being accompanied with considerable noise, and with the ejection of water or steam. Cuvier thus explains the latter circumstance. "Let us suppose the Cetacean to have taken into its mouth some water which it wishes to eject. It moves its tongue and jaws as if it were going to swallow it; but, closing the *pharynx*, it forces the water to mount into the nasal passages, . . . until it raises the valve (between the nasal passage and two pouches or reservoirs), and distends the membranous pouches above. The water once received into these pouches can be retained there until the animal wishes to spout. For that purpose it closes the valve, to prevent the descent of the water again into the nasal passages below, and forcibly compresses the pouches by means of the fleshy expansions which cover them; thus compelled to escape by the narrow crescentic aperture or blow-hole, it is projected to a height corresponding with the force of the pressure."

As the *Cetacea* descend to unknown depths in the sea, where the pressure of the incumbent water must be immense, the opening of this passage into the lungs requires to be guarded by a valve of no ordinary power. It takes the form of

a conical stopper, somewhat resembling the cork of a bottle, but of so dense a texture, and so perfectly adapted to the orifice, that every drop of water is excluded. So closely interwoven are the fibres of this valve, that it can scarcely be cut with a knife.

There is another part of the structure of these interesting animals which has relation to the immense pressure to which they are subjected at great depths. It is the coating of elastic fat in which the whole body is enclosed. When we consider that the pressure is sometimes upwards of a hundred and fifty times as great as that of the atmosphere, we wonder that it does not crush the animal, by causing the collapse of every internal cavity. To sustain this pressure, the body is enveloped in a mantle of very peculiar elasticity; the skin itself is greatly thickened, but, by an open texture of its interwoven fibres, it is made to contain in its structure, a thick layer of oil or blubber. "A soft wrapper of fat, though double the thickness to that usually found in the *Cetacea*, could not have resisted the superincumbent pressure; whereas by its being a modification of the skin, always firm and elastic, and, in this case, being never less than several inches, and sometimes between one and two feet thick, it operates like so much india-rubber, possessing a density and resistance, which, the more it is pressed, resists the more." \*

Another important office is performed by this thick coat of superficial fat. The grand homes of the Whales are the icy oceans of the Polar regions, where warm-blooded animals, as all the

\* Nat. Lib., MAMMALIA. vii. 48.

*Mammalia* are, would require protection against the rapid abstraction of heat from the body. Fat being a slow conductor of *caloric*, the envelopment of the whole body in a thick "blanket," as it has been termed, of this substance, retains the generated heat, and keeps the animal warm at the lowest temperature. Being lighter than water, it also greatly contributes to the buoyancy of the body. A dead Whale floats, but the carcase, when stripped of the blubber, sinks with precipitation.

Thus the whole organization of the *Cetacea* and its perfect adaptation to a sphere of actions, and to habits, very different from those common to the *Mammalia*, displays very numerous, striking, and unexpected examples of the infinite wisdom and goodness with which the Almighty God has made all His works. And surely the observation of such displays, and the awakening of our praises to Him, should be the first objects of scientific studies.

## FAMILY I. DELPHINIDÆ.

(*Dolphins.*)

The genera which are usually placed in this Family, differ from each other in so many particulars, that their characters are rather negative than positive. They agree in having the head of moderate size, as compared with other *Mammalia*: the muzzle usually projects more or less, in the form of a slender beak, the jaws are for the most part both furnished with teeth, very numerous, and conical in form; but are devoid of *baleen* or whalebone. The blow-hole is single, of

a semi-lunar form. The body is lengthened, gracefully tapered, with a regular outline. Most of the species have a dorsal fin.

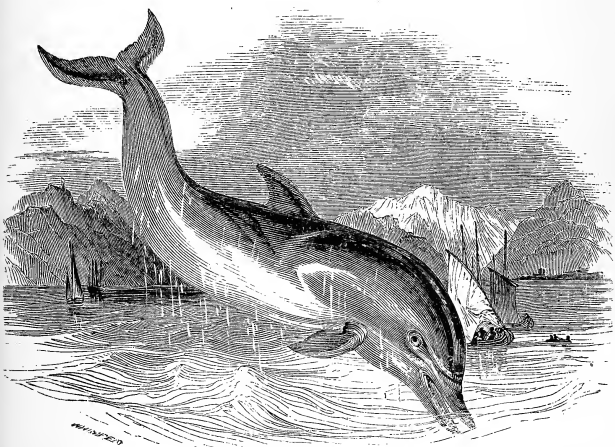
The genera of this Family are the most carnivorous, and, though of small or moderate size, the most cruel of the Order. They are scattered in all seas, and frequently ascend rivers. One genus (*Inia*) is even known to inhabit the mountain lakes of Peru, the fountains of the Amazon, a thousand miles from the sea.

### GENUS *DELPHINUS*. (LINN.)

The genus before us is furnished with teeth far exceeding in number those of any other of the *Mammalia*. The average number, (for it is not uniform even in a given species) is about ninety in each jaw. They cannot be arranged in a formula, as they are all of the same character, and can neither be called incisors, canines, nor molars; they are slender, conical, and pointed, those of one jaw fitting into the interspaces of the other; and hence are adapted for seizing only. The jaws which are thus armed, project in the form of a slender beak, which is separated from the forehead by a groove: the forehead rises abruptly, and is full and rounded. There is a fin on the back.

The Common Dolphin (*Delphinus delphis*, LINN.) is familiar to fishermen and mariners, being found abundantly around the British shores, and all over the Atlantic and Mediterranean. Its beautiful and graceful form, the extraordinary fleetness with which it darts through the waters, its agile gambols and leaps, and its social habits, render it attractive to every voyager. They are

fond of accompanying a ship, even for many miles. We have often been amused with them. No sooner do we discern a "shoal" or "school" of Dolphins frolicking, perhaps a mile or two distant, than we see them having caught sight of the ship, come trooping down with the velocity of



DOLPHIN.

the wind, impelled by curiosity to discover what being of monstrous bulk thus invades their domain. Arrived, they displayed their agility in a thousand graceful motions, now leaping with curved bodies many feet into the air, then darting through a wave with incredible velocity, leaving a slender wake of whitening foam under the water; now the thin dorsal fin only is exposed, cutting the surface like a knife; then the broad and mus-

cular tail is suddenly elevated as the animal plunges perpendicularly down into the depth, or rises beneath the keel to explore the opposite side. So smooth are their bodies, that their gambols are performed with surprisingly little disturbance of the water, and even when descending from their agile somersets, they make scarcely any splashing. It was this playfulness and sociality, doubtless, that made the Dolphin so great a favourite with the ancients; the poets abounding with beautiful fables of its docility and love of man.

The Dolphin produces but a single young one at a time, which she suckles with care and tenderness. The milk is abundant, and of a creamy richness. Its flesh was formerly considered so great a delicacy as to be frequently served at civic feasts. We have tasted it repeatedly, and found it, though dark, tender and not disagreeable.

## FAMILY II. PHYSETERIDÆ.

(*Cachalots.*)

In this and the following Family we find the largest of all existing animals. They are remarkable also for the enormous size of the head, as compared with the proportions of other animals. In the Cachalots the head, which occupies more than one-third of the whole bulk of the animal, terminates in a broad muzzle, appearing as though it had been abruptly cut off, in its full thickness. The lower jaw is narrow, slender, and pointed; the two branches (*rami*) of which it is composed, being united into one for a great part of their

length; and furnished with many stout, conical teeth, somewhat flattened: the upper jaw contains either none, or a few which do not penetrate the gums. They are destitute of *baleen*. The blow-holes have but a single orifice; situated at the top of the broad muzzle.

### GENUS *PHYSETER*. (LINN.)

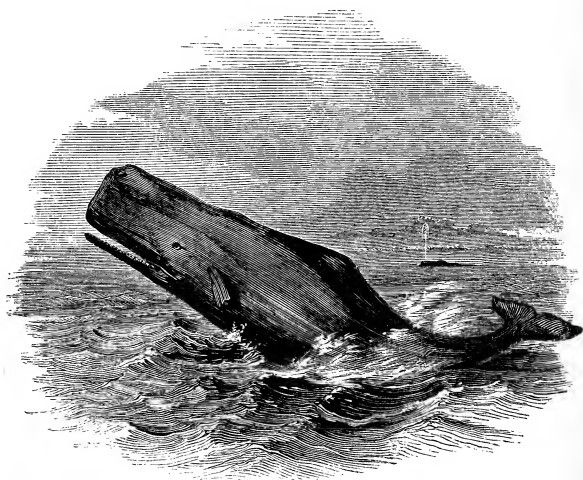
As the present genus, which includes only two or perhaps three known species, constitutes the whole Family, it is needless to repeat the distinctive characters already given. We shall confine ourselves, therefore, to a description of the best defined species, the Sperm Whale (*Physeter macrocephalus*, LINN).

It is not to any extraordinary development of the brain of this animal, nor even of the skull, that the immense bulk of the head is owing; the jaws indeed are greatly lengthened, but the brain is very small, and seated at the back of the head, the whole anterior part forming a huge cavity, known to whalers as the "case," which is not enclosed by bone, but by a thick, tendinous, elastic skin, and lined with a beautiful, glistening membrane. This cavity is filled with a clear oil, sometimes to the amount of ten barrels, which after death cools into the granulated substance, well known, when purified, as *spermaceti*.

The coat of blubber, contained in the texture of the skin of the body, produces an oil, which is much valued, for its clearness, and other qualities, and is known as sperm-oil. These two products form the principal object of the Sperm-whale fishery; a pursuit which, from the remote distance

at which it is prosecuted, the protraction of exile which each voyage involves, the romantic character of its incidents, and its hazardous nature, is perhaps unrivalled among pacific occupations.

Mr. Beale, in his very interesting volume on the Sperm-whale, describes a male of the largest size as about eighty-four feet in length, and twelve or fourteen in diameter, at its thickest part. The



SPERM-WHALE.

fins are small, being no more than six feet long by three broad. They appear to be used rather in balancing the body, and supporting the young, than in giving progress in motion, which is the proper office of the tail. The skin is smooth, of a very dark grey hue, nearly black on the upper

parts, but silvery beneath. Some however are pied. Old males usually have a large spot of pale grey on the front of the head, when they are said to be "grey-headed." The eye is situated just above the angle of the mouth; and over this at the junction of the head with the body, there is an elevation called the "bunch of the neck;" from hence the outline of the back is nearly straight, to within one third of its length from the tail, where there is a larger prominence, called the "hump;" it now rapidly tapers away to the tail, and this slender part is technically distinguished as the "small," while the huge tail spreading widely on each side bears the name of "flukes."

The motions of this enormous animal are exceedingly curious; when moving perfectly at leisure, he swims slowly along, just beneath the surface, effecting his progress by gently striking the fluid with his tail from side to side obliquely. The *bunch* and *hump* may be seen above the water; and by the disturbance which they cause in cutting the surface, some foam is produced, by which an experienced whaler can judge, even at some miles' distance, how fast the animal is going. When alarmed, however, or from any cause inclined to increase his velocity, he uses a very different mode of progression. The broad tail now strikes the water upward and downward alternately with great force; at every blow downward the fore part sinks several yards into the water, while by the force of the upward blow, the head is thrust entirely out of the water. A whale can swim in this way, the head alternately appearing and disappearing, which the seamen call "going head out," at the rate of twelve miles an hour.

In the facility with which the enormous head is projected, we see the wisdom of its immense size; bulky as it is, the fluid oil with which it is filled, rarefied by vital heat, renders it the most buoyant part by far of the animal, being of itself considerably lighter than the surrounding medium: hence, little effort is required to project the breathing orifice, on the summit of the muzzle, into the air; while, again, the swiftness of the animal is greatly increased by the removal of so broad and bulky an extremity from the dense fluid through which it is swimming. "O Lord! how manifold are thy works! *in wisdom* hast thou made them all."\*

The Sperm-whale is found in all seas, but is most abundant in the Pacific, at some particular points of which herds are said to congregate periodically. The pursuit of this enormous animal forms an important branch of commercial enterprise, in which the bold seamen of the United States have the greatest share. The voyage commonly occupies three or four years, and is one of unexampled hazard and privation. Ships of three or four hundred tons are selected for this pursuit, strongly built, and manned with a crew of about thirty hands. A watch is stationed aloft immediately on leaving the port, although the prey is rarely met with in the north Atlantic. This watch is never intermitted during the whole voyage, or at least until a full cargo is obtained. The watch, on the sight of a Sperm-whale, immediately communicates the welcome information by calling aloud in a peculiar tone, "There she spouts!" a cry which never fails to produce a general rush on deck of

\* Psalm civ. 24.

all hands. "Whereaway?" eagerly demands the master; the position of the distant object is pointed out, and at each fresh "spouting," the watch, accompanied by every individual on board who has caught sight of the Whale, vociferates, "There again!" The spoutings being all performed, the elevation of the broad tail into the air, preparatory to descent, is announced in the same manner by "There goes flukes!"

The object of these announcements is explained by the remarkable regularity with which every motion connected with the respiration of this animal is performed. The length of time it remains at the surface, the number of expirations, or *spoutings*, performed on each occasion, the length of the interval between the spouts, the time it remains submerged before again rising to breathe, are all, when the animal is undisturbed, as regular in succession and duration, as can be imagined. This circumstance is of the greatest value to the whaler; for when the periods of any particular Whale have been observed, it may be calculated even to a minute when it will re-appear, and how long it will continue at the surface.

At the first announcement, the boats, which are constantly kept in readiness, are lowered, and manned with joyful alacrity. Every nerve is strained to reach the animal before his spoutings are out, which, in a large bull-whale, may be about ten minutes. If he is too far off, however, they strive to note the direction in which he dives, stationing themselves near the spot where they expect he will emerge. On his re-appearance, the boats are rowed up as silently as possible, and the harpooner of the foremost darts his

weapon with all his strength. At the same moment, he cries "Stern all!" and the oarsmen give the boat stern-way with precipitation. The Whale in his agony dives perpendicularly, drawing the line of the harpoon swiftly through its grove; the other boats are ready to bend on their lines, each of which is two hundred fathoms long; for a Whale will sometimes carry down four lines, descending to the depth of nearly a mile. But again he approaches the surface; "the gurgling and bubbling water, which rises before, proclaims that he is near; his nose starts from the sea; the rushing spout is projected high and suddenly from his agitation." The other boats now infix their harpoons, and sharp steel lances are thrust deeply into the body.

The most dangerous part of the enterprise now ensues: the Whale is in his last agony: he dashes hither and thither, snaps convulsively with his long lower jaw, rolls over and over, coiling the line round his body, or leaps completely out of the water. The boats are often upset, sometimes broken into fragments, and the men wounded or drowned. The crimson blood spouted from the blow-hole, falls in showers around; the poor animal whirls rapidly round in unconsciousness, in a portion of a circle, rolls over on its side, and is still in death.

The body is then towed to the ship; the head is cut off and secured at the stern; a hole is cut into the skin of the fore part of the body, into which a large hook is inserted. A strong pulley being attached to this hook, the blubber is thereby hoisted up, as it is gradually cut by sharp spades in a spiral strip, going round and round the body.

As this band is pulled off, the body revolves, until the stripping reaches the *small*, when it will turn no more. In the mean time, the head having been placed in an upright position, an opening is made in the front of the *case*, and the spermaceti dipped out with a bucket at the end of a pole. The *junk*, a thick mass of tough, tendinous substance, situated beneath the *case*, is then extracted and cut into pieces, as well as the blubber; both of these substances being rendered into oil by means of heat. The products are then stowed away in barrels in the hold.

The preparation of the crude spermaceti, when brought home, is thus performed:—"The mass is put into hair or woollen bags, and pressed between plates of iron in a screw-press, until it becomes hard and brittle; it is then broken into small pieces, and thrown into boiling water, where it melts, and the impurities are separated from it. After being cooled, and taken from the first water, it is put into a boiler of clean water, and a weak solution of potash is gradually added. This is thrice repeated, after which the whole is poured into coolers, when the spermaceti concretes into a white semi-crystallized mass, and on being cut into small pieces exhibits a beautiful flaky appearance, so well known as belonging to the spermaceti of commerce."

### FAMILY III. BALÆNADÆ.

(*Whales.*)

As in the Cachalots, the head of the true Whales is of enormous bulk as compared with the body and extremities, but it does not terminate in a

broad abrupt muzzle. Both sides of the upper jaw are furnished with transverse plates of a horny substance, called *baleen*; the lower jaw is destitute of teeth. The number of species belonging to this family is very limited; they are comprised in two genera, *Balæna* and *Balænoptera*, of which the latter attains the largest size, but the former is the most valuable to man, on account of its yielding, in greater abundance, the important products of oil and *baleen*, or whalebone. The Arctic and Antarctic seas are the principal, but not exclusive resorts of these immense creatures.

#### GENUS *BALÆNA*. (LINN.)

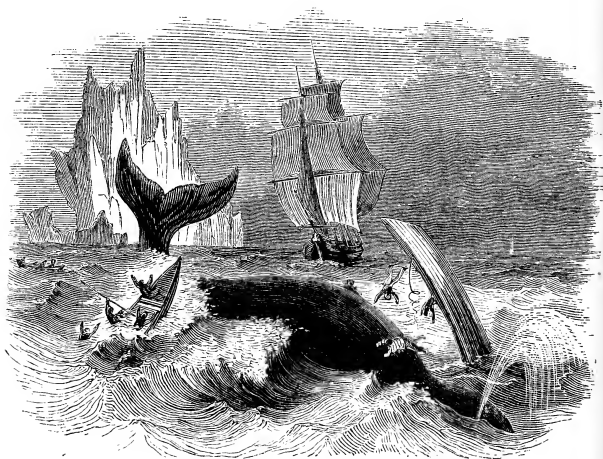
The Whalebone-whale is distinguished as a genus by the total absence of a dorsal fin; by the plates of baleen being large and numerous, and by the skin of the under parts being destitute of folds.

The most valuable species is that of the Arctic Ocean, known as the Greenland Whale, or as the "right whale" of seamen (*Balæna mysticetus*, LINN.). It attains a length of fifty or sixty feet, and a thickness of ten or twelve. The form is clumsy, though in a less degree than that of the Cachalot, the head being large, and the mouth enormous; the gullet, however, is not sufficiently capacious to admit the passage of a man's hand. Its food consists exclusively of minute animals that swarm in its native seas, some of which are small *crustacea*, others *medusæ* and *mollusca*. The food is received in a singular manner. The branches of the lower jaw are slender, and widely arched outwardly, so as to form the frame of an

immense spoon : the mouth is opened at random, and whatever chances to be within the inclosed space is ingulfed. The upper jaw with its transverse plates of baleen, now acts as a strainer, and while the water is driven out through the narrow interstices, the particles of food are retained by the close-set plates, and then swallowed.

The structure and arrangement of the plates of baleen, are thus described by Mr. W. C. L. Martin. "The palate of the Whale is arched and oval, and forms a vaulted roof to which the plates of baleen are attached transversely, in two rows, parallel to each other. Each plate consists of a central, coarse, fibrous layer, lying between two, which are compact, and externally polished, constituting a sort of enamel or varnish ; but which outer layers do not cover the internal or true baleen to its extreme free edge ; the latter, therefore, extends beyond the former, and terminates in a fringe, in which are entangled the small molluscous animals, which constitute the food of this huge animal. Each plate of baleen is of a subtriangular figure, and its base, attached to the palate, has a long furrow, fixed upon a pulp, buried deeply in the firm vascular substance of the gum covering the under surface of the maxillary and intermaxillary bones. The outer layers, of compact matter, are continuous with a white horny layer of the gum, which passes on to the surface of each plate ; and the pulp is therefore the secreting organ of the internal layer of coarse elastic fibres. The number of plates composing each row is from three hundred to four hundred, and the palate being oval, the longest are those situated in the middle ; those towards the muzzle

and near the entrance of the throat being consequently the shortest. The longest of these *laminæ* often measure fifteen feet and upwards in length, and the abbreviation, anteriorly and posteriorly, is gradual. Each plate, as we have said, is fringed, and the filaments of the fringe are very numerous, and fill up the cavity of the mouth sufficiently to form a strainer.”\*



WHALE FISHERY.

The habits and economy of this species agree in many points with those of the Sperm Whale; and the general features of the “fishery” for both are the same; but there are many differences in the details. The Greenland Whale seems to be, now at least, confined to the icy ocean that

\* Pict. Museum, i. 243.

surrounds the North Pole; in former times it probably descended into more temperate climates. It is replaced in the southern hemisphere, by apparently two species, *B. australis*, DESM. and *B. antipodum*, GRAY.

The Whale, under ordinary circumstances, comes to the surface to respire at intervals of eight or ten minutes: when, after having been harpooned, he endeavours to escape by diving, he sometimes remains half-an-hour submerged, but is greatly exhausted after so long a suspension of breathing. He commonly remains about two minutes at the surface, during which he blows eight or nine times. The steam expelled with the expiration, condensed in the cold air, takes the form of a puff of white smoke, as if from the discharge of a gun. The ejection of air is strongest, densest, and loudest, when alarmed, or after a long stay under water. The ordinary speed of the Greenland is much less than that of the Sperm Whale: it seldom exceeds four miles an hour; under the pain of the harpoon, however, it will descend at double that rate of speed, and to such a depth that instances are recorded of Whales coming up with the muzzle covered with clay from the ocean-bottom, and of others having fractured their jaws by the violence with which they had come into contact with the rocks.

“The most pleasing as well as astonishing exhibition of the power and activity of these animals is during the pairing season, when they gamble and frolic in the waters, throwing themselves about in the exuberance of delight, little aware of the approach of their enemies. Some-

times they dart along the surface, and then dive and reascend with such energy as to leap entirely out of the water; sometimes they raise themselves perpendicularly; sometimes, head downwards, they flourish their tails aloft, and lash the water with tremendous violence, throwing the sea around them into foam, and producing a roaring noise resounding to a considerable distance." The affection of the mother for her sucking offspring, is very remarkable; and is taken advantage of by the whalers; who often strike the young one to obtain the mother, knowing that she will not forsake it. Mr. Scoresby has recorded several most affecting instances of this maternal love, stronger than the fear of death. On one occasion, a suckling Whale having been struck, the mother arose to the surface, and seizing her infant beneath her fin, dived instantly, dragging about a hundred fathoms of line with considerable velocity. Again she rose to the surface; furiously darted to and fro; frequently stopping short, or suddenly changing her direction, and exhibiting every symptom of extreme agony. She acted in this manner for a considerable time, though closely pursued by the boats, her maternal concern overcoming all sense of her own imminent danger. The harpoon at length was infixed in her, after two failures; yet, indifferent to pain, she still refused to seek her own escape, but clung to her young one, thus permitting the harpoons of other boats to be thrown, until at length she expired with her offspring, an unresisting prey.

The incessant pursuit of this huge animal, has driven it from regions in which it was formerly abundant, and is perceptibly thinning its numbers

in the seas to which it still resorts. Nothing can be more impolitic than the slaughter of young animals, in themselves nearly useless, as thus the source of future supply is dried up. The Whale produces but one at a birth, which is suckled a long time, until by the development of its plates of baleen, it is able to feed itself on its ocean-supplies.

The whale fishery was carried on as early as the twelfth century, by the inhabitants of Biscay. It does not appear, however, that they sought their huge prey in any more distant locality than the Bay which bears the same name, whence the Whale has long disappeared. The revival of this lucrative pursuit in the more productive regions that lie beneath the Arctic Circle, was owing to the discoveries of those enterprising navigators who sought a north-west passage to the Pacific, about the close of the sixteenth century. Their reports of the great abundance of Whales about the coasts of Greenland and Spitzbergen, awakened the spirit of commercial enterprise in the English and Dutch, who embarked with vigour and success in the new pursuit, and were soon followed by the French, Danes, and Hamburgers. So great was the number of Whales in those seas, and so easy was their capture, that many vessels used to be sent to the shores of Spitzbergen in ballast, which were not engaged in the actual pursuit, but were simply destined to bring home the superabundance of oil and whalebone obtained by the whalers, over and above what their own vessels could carry. The practice then was to boil the blubber into oil upon the shore. The ardour of pursuit, however,

soon diminished the number, and increased the caution of the animals, and as they had to be sought farther from the coast, the establishments for boiling were given up, and, since that time, the blubber is brought home in its crude state, to be manufactured.

In 1820, a very successful year, when, too, the Whale fishery was in the height of its pursuit, Great Britain had 159 ships engaged, 57 of which resorted to Davis's Straits, and 102 to the sea of East Greenland. The amount of tonnage was 50,546. The number of Whales taken was 1595, producing 18,745 tuns of oil, and 946 tons of baleen. In 1834, but 7 British ships were in the Greenland Sea, and 69 in Davis's Straits, making 76 in all engaged, whose united tonnage was 24,955: 872 Whales were procured, yielding 8214 tuns of oil, and 442 tons of baleen. The average price of whale-oil may be about £29 per tun, and that of baleen £163 per ton. Of the ships engaged in the whale-fishery, by far the greater proportion are fitted out from Hull, this port and Peterhead furnishing fully half of the whole: the remainder are distributed among ten other ports, all, with the exception of London, situated either in Northumberland or Scotland.

## ORDER VI. PACHYDERMATA.

(*Thick-skinned Animals.*)

This Order contains animals, which, while they have certain features in common, warranting their association, present so much diversity in detail, as to lack the apparent unity and completeness which other similar groups possess. By the aid, however, of fossil genera and species, unknown in a living state, many blanks are filled up, and links are supplied, by which the creatures of this Order are arranged in a more regular and complete series. In no other Order of Mammalia have the discoveries of organic remains been so copious and so important as in the present.

The *Pachydermata* are, for the most part, animals of large size, and many are of gigantic proportions. They are generally also uncouth and clumsy in form, and heavy in their motions. The name, which Cuvier selected to distinguish the Order, describes a peculiarity, most obvious in the great tropical genera, but more or less observed in all, the thickness of their skin. In the Whales we saw the skin greatly thickened, in order to hold in its tissues the blubber or surface-fat: in some of the *Pachydermata*, as the Hogs and Hippopotamus, there is, in like manner, a tendency to the deposition of a thick layer of fat on the surface of the body, but it is beneath, and not within, the integuments. The skin is usually dense and leathery in its consistence; its external appear-

ance is frequently rough and coarse, thinly clothed with bristly hairs, or almost entirely naked.

The food of these animals is exclusively vegetable: various grasses and aquatic herbage; the thick and succulent plants of tropical plains; bulbous and farinaceous roots; and the young twigs of trees, afford them variety of nutrition. The stomach, however, is either simple, or, where compound, is not capable of the process of rumination. The molar teeth are compound, often triple, with flattened crowns: in many, there is a peculiar development of the canines or incisors into curved and projecting tusks. The muzzle is frequently produced into a projecting proboscis, as in the Elephants, Tapirs, and in a less degree in the Hogs; or into a lengthened and flexible upper lip, as in most of the Rhinoceri.

Being destitute of clavicles, the fore limbs of the terrestrial *Pachydermata* have not the freedom and mobility necessary to constitute them organs of climbing, or of seizing and holding prey, or of dealing and warding blows in conflict. The limbs are simply organs of motion, and of support; hence they assume the form of pillars, more or less perpendicular; and their extremities, though divided as to the skeleton into distinct toes, are so encased in the common integuments as to be undivided externally, except that the last joints of the toes are encased in hollow, box-like hoofs. In the first family, the link which connects the present Order with the preceding, the hind limbs are wanting, and the fore limbs resemble the swimming paws of the Whales; the extremities of the toes, however, being marked by small horny claws.

The torrid zone, and those regions which are

contiguous to the tropics, are the home of the *Pachydermata*, and they most abound in the hottest parts of Africa, and of continental and insular Asia. The Hog, the Horse, and the Ass, are dispersed in a state of domestication, wherever civilized man has taken up his abode. The largest of all terrestrial animals are found in this Order; and they exhibit a massiveness of form and structure, combined with a strength that is almost irresistible. "Their pace, when they have fairly commenced it, from the length of their stride, and the great propelling weight of their bodies, is for a time very rapid, and bears before it all ordinary obstacles, clearing a way through the thickest and most matted underwood."\* For the most part, they are peaceful and inoffensive, but, if irritated, they frequently manifest a furious and vindictive ferocity. Some of the African Rhinoceri are, however, of a spontaneously savage and spiteful disposition.

The *Pachydermata* present some difficulty in their subdivision, but we may consider them as comprised in five families, *Manatidæ*, *Elephantidæ*, *Suidæ*, *Rhinocerotidæ*, and *Equidæ*.

#### FAMILY I. MANATIDÆ.

(*Manatees.*)

We find here a group of aquatic animals, the forms of which differ so greatly from those that we are about to notice, and are so obviously modelled on that of the Whales, that they have ordinarily been ranked under the Order *Cetacea*.

\* Naturalist's Library, PACHYDERMATA, p. 95.

In their aquatic habits, their fishlike form, their smooth bodies, gradually tapering and terminating in a broad horizontal fin, their total want of posterior limbs, and the contraction of the anterior into flippers or swimming paws, the resemblance to the last named animals is very manifest. But the resemblance is almost confined to external characters; the whole internal structure, as Professor Owen has shewn, differing very widely from that of the carnivorous *Cetacea*; so that, to use the words of this eminent physiologist, "the amount of variation is as great as well could be in animals of the same class, existing in the same great deep. The junction of the Dugongs and the Manatees with the true Whales cannot therefore be admitted in a distribution of animals according to their organization. With much superficial resemblance, they have little real or organic resemblance to the Walrus, [with which they were associated by Linnæus,] which exhibits an extreme modification of the amphibous carnivorous type. I conclude, therefore, that the Dugong and its congeners must either form a group apart, or be joined, as in the classification of M. de Blainville, with the Pachyderms, with which they have the nearest affinities, and to which they seem to have been more immediately linked by the now lost genus *Dinotherium*."

The food of the *Manatidæ* consists of sea-weeds, the grass of rivers, and other aquatic herbage: for the digestion of which they are furnished with a stomach divided into several sacs. They have no canine teeth: the molars are compound or semi-compound, with plain or furrowed crowns: the genus *Rytina* has no molars, but their place is

supplied by a horny plate in the middle of each jaw. The *mammæ* are two, situated upon the breast, as are those of the Elephant. The lips are set with thick wiry bristles: the nostrils are placed at the extremity of the muzzle, which is obtuse and truncated; the eyes are protected by an inner membrane, which can be drawn over the iris: the bones of the skeleton are dense and solid in texture, and not filled with oil, as in the *Cetacea*.

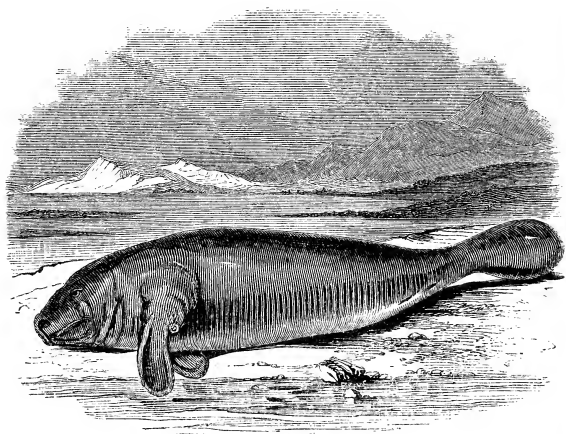
### GENUS *MANATUS*. (Cuv.)

The form of the Manatee has been compared to that of the leathern bottles used in the south of Europe. The body is oblong, terminated by an oval tail-fin; the head is somewhat conical, with a broad, tumid muzzle; beset with stiff, but very short bristles; no perceptible depression marks the situation of the neck. There are eight molars in each jaw, which are ridged doubly or trebly, and have the root distinct from the crown; strongly resembling those of the Hippopotamus and Tapir: there are no canines, nor incisors in the adult. The swimming paws have vestiges of nails at their edge. The skin is rough and coarse, like that of an elephant.

The best known species is the Manatee of America, (*Manatus Americanus*, Cuv.) which frequents the mouths of rivers, and quiet secluded bays and inlets in the islands of the West Indies, and the coasts of Guiana and Brazil. It is said to attain nearly twenty feet in length, and is of a dull bluish-black hue, with the inferior parts rather lighter. It is gregarious in its habits, capable of strong attachment to its species, which

is especially manifest in the females towards their offspring. It has been stated that if one of a herd has been harpooned, its companions will assemble round, and attempt to drag out the weapon; and if the cub be taken, the mother will fall an easy prey, her maternal affection being more powerful than her instinctive fear of man.

From personal experience we can confirm Hernandez's statement of the excellence of the flesh of the Manatee: he truly compares it to well-



MANATEE.

fatted pork of pleasant flavour. The pursuit of it on this account, has rendered it scarce in many localities where it was formerly numerous: in the vicinity of Cayenne, it was at one time so common, that a large boat might be filled with them in a day, and the flesh was sold at threepence

per pound. About the middle of the last century it fetched at Port Royal, in Jamaica, fifteen-pence (currency) per pound.

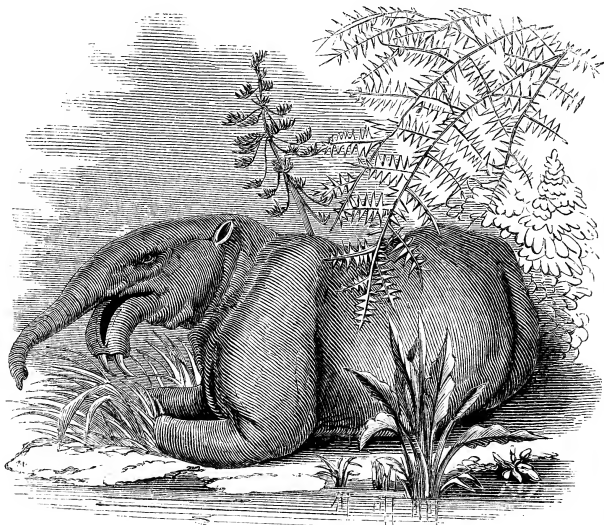
The Manatee is captured by means of the harpoon. At St. Domingo, the hunters approached them in a small boat, and struck them with a harpoon attached to a stout cord. The wounded animal made violent efforts to escape, but its movements were impeded, as well as revealed, by means of a buoy of cork or similar material fastened to the end of the line. At length, the animal exhausted with its efforts, was towed to the shore, and there killed. The sport was considered as peculiarly diverting, though not unattended with danger from the capsizing of the boat in the struggles of the Manatee in the shoals.

Specimens of this species have been cast on the shores of the British Isles; but they were dead, and in an advanced stage of decomposition.

An enormous extinct animal (*Dinotherium*), known as yet exclusively by its skull, seems to have been intermediate between the aquatic and the terrestrial *Pachydermata*. The incisors of the lower jaw form two immense tusks, with their roots encased in enormous sockets, which project downward and backward, in the same manner as those proceeding from the upper jaw of the Morse. The size and situation of the nasal orifice have led to the presumption that it was furnished with a proboscis; and Professor Kaup conjectures its general appearance to have resembled the accompanying representation.

Dr. Buckland considers it as nearly allied to the Tapirs, but still more aquatic, inhabiting freshwater lakes and rivers. "To an animal of

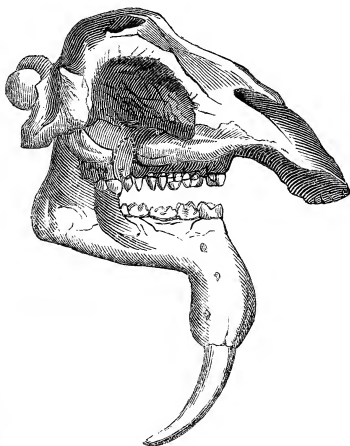
such habits, the weight of the tusks sustained in water would have been no source of inconvenience; and if we suppose them to have been employed as instruments for raking and grubbing up by the roots large aquatic vegetables from the bottom, they would under such service, combine



SUPPOSED FORM OF DINOTHERIUM.

the mechanical powers of the pick-axe with those of the horse-harrow of modern husbandry. The weight of the head, placed above these downward tusks, would add to their efficiency for the service here supposed, as the power of the harrow is increased by loading it with weights. The tusks

of the *Dinotherium* may also have been applied with mechanical advantage to hook on the head of the animal to the bank with the nostrils sustained above the water, so as to breathe securely during sleep, whilst the body remained floating at perfect ease beneath the surface: the animal might thus repose, moored to the margin of a lake or river without the slightest muscular exertion, the weight of the head and body tending to fix and keep the tusks fast anchored in the



SKULL OF DINOTHERIUM.

substance of the bank; as the weight of the body of a sleeping bird keeps the claws clasped firmly around its perch. These tusks might have been further used, like those in the upper jaw of the Walrus, to assist in dragging the body out of the water; and also as formidable instruments of de-

fence. The structure of the *scapula* [or shoulder-blade] seems to shew that the fore-leg was adapted to co-operate with the tusks and teeth in digging and separating large vegetables from the bottom.”\*

M. de Blainville, however, and some other of the French zoologists, contend that the *Dinotherrium* approached still nearer to the *Manatidæ*; that it was, in fact, “a Dugong with tusk-incisors.” And they judge that the magnitude of the nasal opening, and the enlargement of the surrounding surfaces, would agree as well with an immense and overspreading upper lip, as with a proboscis. There is, however, no reason to doubt that this singular form supplied a connecting link between the Dugongs and the Elephants.

This animal is believed to have measured eighteen feet in length: the lower jaw, exclusive of the tusks, measures four feet in length and three in breadth. The character of the molar teeth shews that its food was exclusively vegetable.

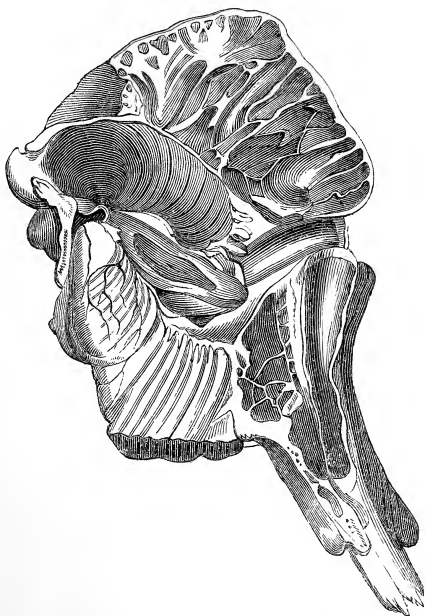
## FAMILY II. ELEPHANTIDÆ.

(*Elephants.*)

In these huge animals there are five toes on each foot, which are perfectly distinct in the skeleton, but are so entirely enveloped in the thick and callous skin of the foot, that there would be no indication of them externally, but for the round box-like nails or hoofs, attached to the extremity of this sort of shoe. There are no canine teeth; nor incisors, properly speaking, but in the incisive bones of the upper jaw are

\* Bridgewater Treatise.

implanted two tusks, which project from the jaw and curve upwards, frequently attaining a great length and magnitude. The size of the sockets in which these tusks are imbedded, renders the upper jaws so high and so shortens the bones of the nose, that in the skeleton the nostrils are situated nearly at the top of the face; but during



SECTION OF THE ELEPHANT'S SKULL.

life they are prolonged into a tubular proboscis, which we shall presently describe. The skull is large and greatly elevated, but the size of the

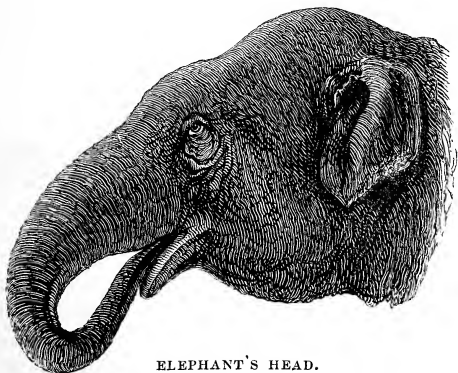
brain is not correspondent to that of the skull; for in the latter are several great cavities, occupied only by air-cells of thin bone; and thus enlarged surface is afforded for the attachment of the muscles needful to move the proboscis and lower jaw, without increasing the weight of the head, already sufficiently burdened with the massive tusks, and fleshy trunk. There are no incisors in the lower jaw. The *mammæ* are two, situated on the breast: the young, one of which only is born at a time, suck with the lips, and not with the extremity of the proboscis, as has been erroneously supposed.

But a single living genus belongs to this family; but there is a fossil animal, the Mastodon, which resembled the Elephants in most respects, with some important peculiarities in the structure of the molar teeth. One species,—the remains of which are found in great abundance, and in a wonderful state of preservation, scattered over the prairies of North America,—equalled the Elephant in size, and surpassed it in the massiveness of its proportions.

#### GENUS *ELEPHAS*. (LINN.)

The proboscis of this sagacious animal demands our first notice. This wonderful organ, which confers upon the Elephant much of the versatile power of the human hand, is composed of an immense number of small muscles variously interlaced, so as to produce the powers of extension, contraction, and motion, in all directions. Cuvier computes the number of muscles having distinct action in this organ, as not far short of

forty thousand. It is of a lengthened, nearly cylindrical form, pierced through its whole length with two tubes which are the prolongations of the nostrils. "On the upper side of the extremity, immediately above the partition of the nostrils, is an elongated process, which may be considered as a finger; and on the under edge is a sort of tubercle, which acts as an opposable point; in short, as a thumb. Endowed with exquisite sensibility, nearly eight feet in length, and stout in proportion to the massive size of the whole animal, this organ, at the volition of the Elephant, will uproot trees or gather grass, raise a piece of artillery or pick up a comfit, kill a man

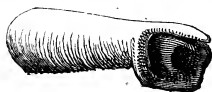


ELEPHANT'S HEAD.

or brush off a fly. It conveys the food to the mouth, and pumps up the enormous draughts of water, which by its recurvature are turned into and driven down the capacious throat, or showered over the body. Its length supplies the place

of a long neck, which would have been incompatible with the support of the large head and weighty tusks. A glance at the head of an Elephant will shew the thickness and strength of the trunk at its insertion; and the massy arched bones of the face, and thick muscular neck, are adapted for supporting and working this powerful and wonderful instrument.”\*

In the minute and interesting account given by M. Houel, of two Elephants, male and female, which were placed in the Jardin des Plantes, at Paris, in the year 1802, the appearance and functions of the extremity of the proboscis are well noticed, and illustrated by engravings, from which the following are copied. That of the male differed a little in form from that of the female, its outline approaching a square form, while that of the latter was more triangular.

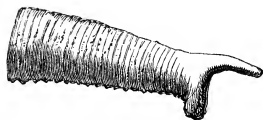


Male.



Female.

END OF PROBOSCIS.



The same in profile.

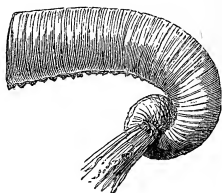
The proboscis is invariably used to collect food; whether leaves are to be plucked, fruits to be gathered, or grass to be cropped, the flexible trunk is the effective

organ. Though so large an animal requires an immense quantity of food, and hence must be

\* Penny Cyclop. Art. ELEPHANT.

mainly supplied from that which is coarse and common, yet he is fond of delicacies, and the sensible tip of his proboscis is constantly in requisition to select minute dainties, as berries and other small fruits, farinaceous roots, &c. Grass, or similar herbage, is cropped by twisting the trunk spirally round it; and as much muscular power is obtained by this action, it is employed whenever the object grasped offers resistance, as in the dragging down of the boughs of trees to browse on their leaves.

Frequently the amount collected by a single action of the trunk is so small as to be unworthy of the trouble of conveying it singly into the mouth; in this case the Elephant places it behind the projecting edge, which answers as a *thumb*, while with the finger he gathers more. M. Houel thus speaks of this habit:—"One of the Elephants seeing me look at him attentively, stretched out his trunk, as if to ask for something to eat. I looked about, and having found a bunch of carrots, picked out the smallest and gave it to him. He noticed my intention, and made me understand that so small a carrot did not deserve the trouble of folding his trunk in order to carry it to his mouth; for he took the carrot with his



GATHERING STRONG HERBAGE.



MODE OF HOLDING A ROOT.

finger, and immediately passed it behind the *thumb*, turning back the latter so as to hold it securely. He then extended his trunk for another supply. I gave him another small carrot, which he put into the same place as the first; I gave him another, and then he bent his trunk, and put all three into his mouth. On giving him larger carrots he united two for a mouthful, but the largest of all he took single."

The importance of the trunk is well known to the Elephant himself; it is his first care in time of danger. When sustaining the attack of a tiger or other wild beast, the trunk is raised high in the air; he will rarely strike a heavy blow with it, though he will throw stones and clods at distant objects which he dislikes, as he often does at hogs. An Elephant that was accidentally burned to death, at Dublin, in the year 1681, had been so solicitous about this precious organ, that it was found thrust nearly two feet into a very hard ground. Nor is this a needless care. Mr. Williamson saw an Elephant in India, whose trunk had been accidentally cut through with a bill-hook; and though the wound was healed, the animal was perfectly helpless; unable to supply its own food, and incapable of even travelling without danger. He was fed with bundles of grass, which were put into his mouth; had he been in a state of nature, he must have perished.

The incisors, which are found only in the upper jaw, form a conspicuous feature of the Elephant, and are well known by the name of tusks. They project with an outward and upward curve, are round, and terminate in a blunt point; they continue to grow as long as the animal lives, but the

point is continually wearing by friction. They vary indefinitely in length; but some are recorded of immense magnitude. Several tusks, measured by Eden, were nine feet in length, and one, described by Hartenfels, was in the possession of a Venetian merchant, which exceeded fourteen feet. The same writer has given 325 lbs. as the weight of a tusk, and one is on record as having been sold at Amsterdam, on the authority of Klokner, which weighed 350 lbs. The tusk is hollow for a considerable part of its length, and the cavity contains a living pulp, which is continually supplying new layers of ivory to the interior surface.

As the Elephant's stomach is not endowed with a ruminating power, the herbaceous food destined for its nourishment requires to be well masticated by the grinding action of the molar teeth. The wearing away of their crowns by this constant action would soon reduce them to an useless condition, and hence the life of the animal would be very short, were there not some mode of renewing them. For to an herbivorous animal the wearing away of teeth that cannot be renewed, is precursive of a speedy death, and in most cases the decay of the teeth is simultaneous with a general decay of the constitution; a merciful provision, without which herbivorous animals would inevitably be starved to death. "The teeth of the deer and sheep," observes Sir E. Home, "are worn down in a much less time than fifteen years; those of horned cattle in twenty years; those of the horse in forty or fifty years; while those of the Elephant last a century: if the animal were to grow to double its present size, there is a provision for the continuance of the teeth: but as soon

as the growth of the jaw is stopped, the succession of the teeth is arrested also, which fixes the duration of the animal's life." \*

The structure of the teeth will be understood by the following extract from a paper which was subjected to Mr. Corse's revision, in Brewster's Edinburgh Encyclopædia:—

“The Elephant has no cutting-teeth in either jaw in front; but he is furnished with most powerful grinders, that enable him to bruise the vegetables on which he feeds. These teeth, as in all herbivorous animals, have an uneven surface; but do not rise into points, as in animals which feed on flesh. Each grinder is composed of a number of perpendicular *laminæ*, which may be considered as so many teeth, each covered with a strong enamel, and joined to one another by a bony substance of the same quality as ivory. This last substance, being much softer than the enamel, wears away faster by the mastication of the food, so that the enamel remains considerably higher; and in this manner, the surface of each grinder acquires a ribbed appearance, as if originally formed with ridges. From very accurate observations which have been made on the Asiatic Elephant, it appears that the first set of grinders, or milk-teeth, begin to cut the jaw eight or ten days after birth, and the grinders of the upper jaw appear before those of the lower one. These milk-grinders are not shed, but are gradually worn away during the time the second set are coming forward, and as soon as the body of the grinder is nearly worn away, the fangs begin to be absorbed. From the end of the second to the beginning of the sixth

\* Home's Comp. Anat. i. 215.

year, the third set come gradually forward as the jaw lengthens, not only to fill up this additional space, but also to supply the place of the second set, which are, during the same period, gradually worn away, and have their fangs absorbed. From the beginning of the sixth to the end of the ninth year, the fourth set of grinders come forward to supply the gradual waste of the third set. In this manner, to the end of life, the Elephant obtains a set of new teeth, as the old ones become unfit for the mastication of its food.

“The milk-grinders consist each of four teeth, or *laminæ*; the second set of grinders of eight or nine *laminæ*; the third set of twelve or thirteen; the fourth set of fifteen, and so on to the seventh or eighth set, when each grinder consists of twenty-two or twenty-three: and it may be added, that each succeeding grinder takes at least a year more than its predecessor, to be completed.”

As each tooth advances, only a small portion pierces the gum at once; one of twelve or fourteen *laminæ*, for instance, shews only two or three of these through the gum, the remainder being as yet imbedded in the jaw; and in fact the tooth is complete at its fore part, where it is required for mastication, while behind it is still very incomplete; the *laminæ* are successively perfected as they advance. The molar of an Elephant can never, therefore, be seen in a perfect state; for if it is not worn in front, the back part is not fully formed, and is without fangs; and when the structure of the hinder portion is perfected, the front part is already gone.

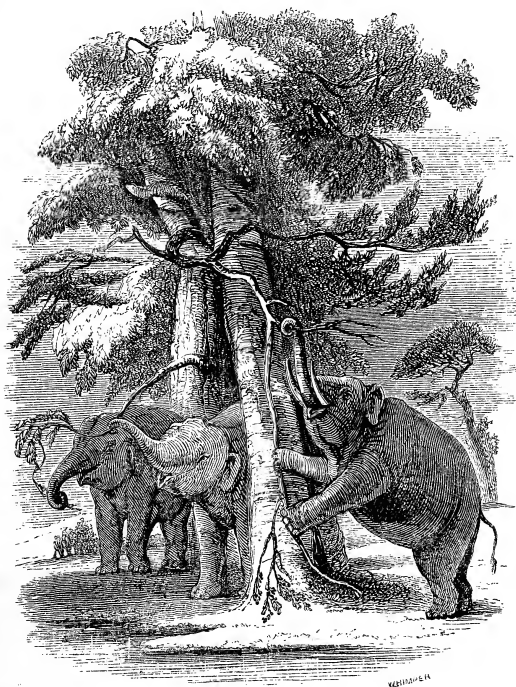
If the reader will glance at the section of an Elephant's skull, represented at page 131, he will see an illustration of these processes: the first

molar is reduced to minute dimensions by the wearing down of its surface, and by the absorption of its fangs, while it is almost pushed out by the advance of the second. Of this about two-thirds of the surface are partially ground away, while the posterior *laminæ* are not yet perfected. Behind this is the germ of its successor, as yet inclosed in its membranous capsule, and lodged in the cavity of the jaw.

Two species of Elephant are at present existing; and one is found in a fossil state. Of the former, one is confined to the two peninsulas of India, and the great adjacent islands; the other is spread over the expanse of Africa, from the Desert to the Cape of Good Hope. The specific distinctions are not very conspicuous. The head of the Asiatic species (*Elephas Indicus*, Cuv.) is oblong, with the forehead concave: the ears are comparatively small, or at least of moderate size; the *laminæ* on the crowns of the molar teeth present the appearance of transverse parallel ribands with wavy edges; and the hind feet have four hoofs. The Elephant of Africa (*E. Africanus*, Cuv.) has a rounder head with a convex forehead; ears so large as to cover the whole shoulder; the *laminæ* of the teeth present lozenge forms; there are but three hoofs to each hind foot; and the tusks are usually larger than in the former.

The Indian Elephant rarely exceeds ten feet in height: the East India Company's standard for serviceable elephants is seven feet and upwards at the shoulder. Those from Pegu and Siam are much larger than those of Hindostan: and the skeleton of one, in the Museum at St. Petersburg, measures sixteen feet and a half.

In a wild state, these animals associate in large herds, which wander among the succulent herbage of the great forests watered by pools and



YOUNG ELEPHANTS.

unfailing streams, under the conduct of the oldest and largest males. From the most ancient times individuals have been captured, by various stra-

tagems, and reduced to captivity, where their power and their docility have made them valuable servants of man. These artifices have undergone little variation for ages. In the present day, when a herd of elephants is discovered, about three hundred men are employed to form a great circle around them, who light fires at each station. Early next morning, one man is despatched from each station to form a second circle outside, in that direction in which they wish to drive the animals. When this is made, the two circles unite into an oblong, and the men behind begin to shout and make as much noise as possible, which causes the elephants leisurely to advance. When they are got within the area of the new circle, its hindmost part is closed up, and the men light fires to pass the night as before. In the morning the same process is repeated, and thus the herd, avoiding the din behind it, gradually advances in the desired line. If really alarmed, the animals could easily break through the circle; but this the hunters carefully avoid; never shewing themselves, and content to annoy the quiet animals by their noise. The fires by night keep them from approaching the circle.

In this manner they are driven to the *keddah*, an immense inclosure, formed of massive beams, terminating in a second, or even a third inclosure of smaller dimensions, but of similar strength. The last has a narrow outlet, through which only a single elephant can pass at a time. Though the bars of this prison are studiously concealed, much difficulty is often found to induce the sagacious creatures to enter; the herd frequently rushes back, and has to be reassembled by the same

tedious process. If the leader enters, however, the others all follow.

When once within the enclosure, fires are lighted round the entrance; and by shouts, beating of drums, firing of guns, and all sorts of noises, the hunters endeavour to drive the ensnared herd onwards. These, now infuriated, scream, and endeavour to return, but find the gateway strongly barricaded; and as the ditch which surrounds all the rest of the keddah is interrupted here, a line of fire is kept up within the fence, and fed from the top of the palisade with dried grass and bundles of reeds. Finding but one opening, they at length essay this, and pass into the second inclosure, the gateway of which is instantly shut by beams dropped from above. In the same way as before they are urged onward into the last inclosure, in which they must remain several days. The animals now appear desperate; in their fury they rush towards the ditch in order to break down the palisades, inflating their trunks, screaming shrilly, or growling like the hollow muttering of distant thunder. Water is supplied to this part of the ditch, that the exhausted creatures may quench their thirst, and cool their bodies by spouting it from their trunks. They remain angry, and vigilant, ever seeking to escape; but the fires and clamours of the people repel their attacks at every point.

After two or three days the door of the narrow passage is opened; and one of the elephants is enticed to enter by food thrown down before him. When quite in, the gate is suddenly shut, and two stout beams that stood, one on each side, are dropped across each other in a diagonal po-

sition, so as to strengthen the door, and a similar cross is dropped on the opposite side of the door. To make the retreat impossible, horizontal bars are thrust across, through the palisades, both before and behind the crosses. The passage is too narrow to allow an elephant to turn, but as soon as he hears the noise of the shutting of the gate, he pushes himself against it backwards, but without avail. Finding his retreat cut off, he exerts his utmost force to break down other bars, which were previously put across a little farther on, running against them, screaming and roaring, and battering them like a ram, with repeated blows of his head, retreating and advancing with the utmost fury.

At length, when he is exhausted, strong ropes with nooses are spread around him, and no sooner does he step into one, than he is fast bound to the palisades. When sufficiently secured, a sort of harness of powerful ropes is fastened around his body; and, lastly, two stout cables are firmly attached to him, the ends of which are fastened to two tame elephants. The outer door is then opened, the fastenings of his legs slipped, and he is led out by his treacherous brethren to a spot where he is bound to two trees. The tame animals there leave him, a prey to rage and despair: his agony is fearful; he tramples the food which is offered him under his feet, and sometimes even falls a victim to his paroxysms of fury. Usually, however, hunger breaks his pride; he begins to eat; and then gentle treatment soon makes him submissive.

## FAMILY III. SUIDÆ.

(Hogs.)

The Hogs and the Hippopotami, though disagreeing in some important points, may be conveniently grouped together. They have four toes on each foot, which are more cleft than in other *Pachydermata*, the extremities being incased in hoofs; the central pair of toes are larger than the others, and in most of the genera, their hoofs assume much of the form of those of the Ruminants: in these the lateral toes are shorter, and scarcely touch the ground. In many respects, also, they approximate the Ruminants in the details of the skeleton and the complication of the stomach. They have always incisors and canines; the latter usually project from the mouth in the form of tusks, more or less recurved; and those of one jaw rub against those of the other. The upper lip is much developed; either into a tumid and flattened muzzle, or a truncated and margined snout. They have a short tail, small eyes and ears; a body for the most part massive, more or less round, supported on rather short limbs; the skin is frequently denuded (at least partially) of hair; and there is a copious deposition of fat between the skin and the muscles.

The Family is scattered over the world; though it is not numerous in species. Most of them are natives of Africa; one genus, that of the Peccaries, is confined to South America; and of the true Hogs it is uncertain how far the general distribution may be dependent on domestication, even in countries where it now exists in freedom.

They all affect moist and marshy places, and one genus is semi-aquatic. Several new species of *Sus* have recently been discovered in the great Oriental Islands.

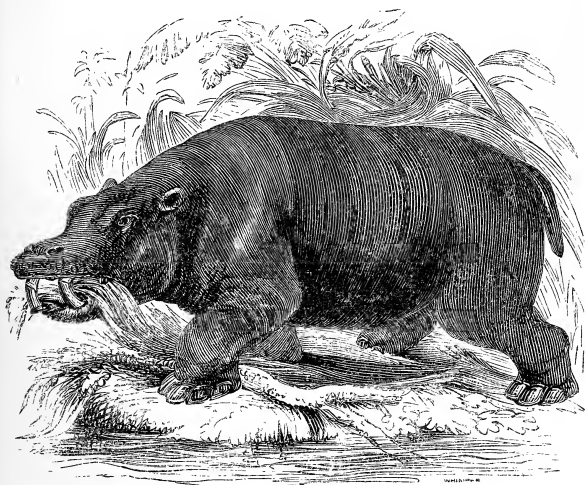
GENUS *Hippopotamus*. (LINN.)

The Hippopotamus is generically distinguished by the following characters: four toes on each foot, nearly equal, terminated by small hoofs; six molar teeth on each side of each jaw, the anterior three of which are conical, the others presenting two pairs of points which, when worn down, assume the figure of a trefoil; four incisors in each jaw, those of the upper short, conical, and recurved; those of the lower projecting horizontally, the middle pair long, and cylindrical, the outer pair short, both pointed; canines in both jaws, the upper short, the lower assuming the form of thick, cylindrical, curved tusks, cut off obliquely with a chisel-like edge; the upper short tusk is also worn down obliquely by rubbing against its opponent.

The animals of this genus are of vast bulk, the body being immensely massive, and the head enormous, broad and flattened, with a swollen muzzle inclosing the great incisors and canines. The body is destitute of hair; the legs are short but thick; the tail and the ears are very short; the eyes are small, and set far up on the flat summit of the head. The stomach is divided into several sacs. The hide is coarse, and of immense thickness, being upwards of two inches in depth on the back and sides.

Africa, that continent of uncouth and gigantic animals, is the exclusive home of the Hippo-

tami; which wallow in its great rivers from the Senegal and the Upper Nile to the streams of the Cape Colony. M. Desmoulins considers that the species of the northern rivers is distinct from that of the south, and he distinguishes the two as *Hippopotamus Senegalensis*, and *H. Capensis*. The differences, however, are anatomical, and do not affect either the external appearance, or the habits of the animals, so that in a general description we may speak of both as one.



HIPPOPOTAMUS.

The recent zoological investigations of Dr. Smith in South Africa have added many interesting particulars to our knowledge of these huge animals. "In districts fully inhabited by man,"

he observes, "they generally pass the day in the water, and seek their nourishment during the night; but in localities differently circumstanced they often pass a portion of the day as well as the night upon the dry land. In countries in which the night-time constitutes the only safe period for their leaving the water, they are generally to be seen effecting their escape from it immediately before dark, or are to be heard doing so soon after the day has closed, and according to the state of the surrounding country; they then either directly commence feeding, or begin a journey towards localities where food may exist. When, previous to nightfall, they may have been in pools or rivers, they are generally at once enabled to commence feeding on reaching the dry land: but when they may have passed the day in the sea, they require commonly to proceed some distance after leaving it, before they find the grass which appears congenial to their palate. It is not every description of grass that Hippopotami seem to relish: they often pass over in search of food, luxurious green swards, which would strongly attract many other animals which feed upon grass."

When undisturbed, the Hippopotamus is quiet and inoffensive; or at least is injurious only by his depredations on cultivated grounds. But attacked and hard pressed he becomes furious, and rushing with open jaws on his enemy, his giant strength and overwhelming impetus render him a formidable adversary. In a boat it is dangerous to irritate him. Captain Owen records an incident that had nearly been fatal. A party being engaged in exploring a river, a violent shock was suddenly felt beneath the boat, when suddenly

“a monstrous Hippopotamus reared itself up from the water, and in a most ferocious and menacing attitude rushed open-mouthed at the boat, and with one grasp of its tremendous jaws seized and tore seven planks from her side. The creature disappeared for a few seconds, and then rose again, apparently intending to repeat the attack, but was fortunately deterred by the contents of a musket discharged in its face. The boat rapidly filled, but as she was not more than an oar’s length from the shore they succeeded in reaching it before she sank. The keel, in all probability, had touched the back of the animal, which, irritating him, occasioned this furious attack; and had he got his upper jaw above the gunwale, the whole broadside must have been torn out. The force of the shock from beneath, previously to the attack, was so violent that her stern was almost lifted out of the water, and Mr. Tombs, the midshipman steering, was thrown overboard, but fortunately rescued before the irritated animal could seize him.”\*

The flesh of this vast creature, which has been compared to an immense, overgrown *prize-pig*, is much esteemed as an article of food. In South Africa it is in high request with the colonists, and we are told that the epicures of Cape Town do not disdain to use their influence with the country farmers to obtain a preference in the matter of *Sea-cow’s speck*, as the fat which lies immediately under the skin is called when salted and dried. Out of its thick hide, excellent whips are manufactured. They are said to be made by cutting the fresh skin into triangular strips five

\* Owen’s “Narrative of Voyages, &c.”

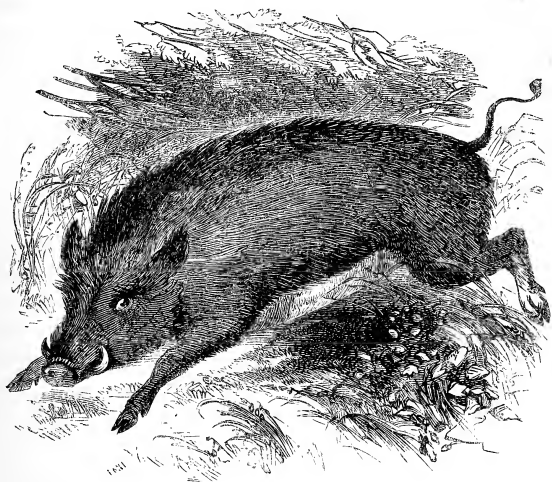
or six feet in length; one end of the strip is pointed, and it gradually widens till the breadth at the upper end is equal to the intended circumference of the bulk of the whip. The strip is then rolled up so as to form a conical pipe, and being firmly bound to keep it in place, is dried in the sun. A light, elastic, and durable whip is produced by this process. The great tusks of the Hippopotamus are composed of the very best ivory, and are imported into Europe in great numbers, where they bear a high price. They are largely used in the construction of artificial teeth, for which their whiteness well adapts them.

Though scarcely less bulky than the Elephant, the shortness of its legs makes the Hippopotamus seem much smaller; it rarely exceeds five feet in height. Its general colour is described as dusky brownish red, passing on the sides and limbs into a light purple red or brown: the under parts, the lips, and the eyelids are light wood-brown, with a tinge of flesh-colour; the hinder and lower parts are freckled with dusky brown. Le Vaillant observes, that when seen beneath the water, the skin appears of a deep blue.

#### GENUS *Sus*. (LINN.)

In the Hogs we find two large middle toes to each foot, armed with strong pointed hoofs, and two small lateral ones which hardly touch the ground. They have six incisor teeth in each jaw, which slant forward; the canines project from the mouth and curve upward, forming angular tusks; the molars are seven on each side of each jaw, beset with tubercles. The muzzle

is lengthened into a moveable snout, the extremity of which is truncated, and expanded into a circular disk, fitted for turning up the earth. Cuvier remarks that there is an observable approximation in the Hogs to the *Carnivora*, especially in the form of the skull; and it is well known that Swine search eagerly for worms, and insects, and that they will not refuse the flesh of larger animals.



WILD BOAR.

The Wild Hog (*Sus scrofa*, LINN.) from which we may without much doubt trace the parentage of our common domestic breeds, was formerly the tenant of the dense forests of Britain, as it is still of the wooded parts of the continent. In the reign of Henry II., Fitzstephen mentions it with

other wild animals as ranging the woods around London:—"On the north [of the city] are corn-fields and delightful meadows, intermixed with pleasant streams on which stands many a mill, whose clack is so grateful to the ear; beyond them an immense forest extends itself, beautified with woods and groves, and full of the layers and coverts of beast and game, stags, bucks, boars, and wild bulls."

"The chace of the Wild Boar," observes Mr. Bell, "has always been considered as a sport presenting the highest interest and excitement, and it is certainly one of the most dangerous. The old males are preferred to those of a less advanced age, as being less swift in their flight, both on account of their greater obesity, and the confidence which they feel in their own strength; they are also less dangerous, as their tusks are much more curved, and are thus less capable of inflicting severe and well-directed wounds. When once at bay, the Boar becomes indiscriminately furious. He turns on his persecutors, and strikes at the nearest, often ripping open the belly of a horse or dog; and the hunter himself is in no little jeopardy, if he be on foot, or his horse have thus been disabled."\* "When roused by the hunter and his dogs, the old Boar retreats sullenly and slowly, gnashing his teeth, foaming with rage, and often stopping to rush with furious impetuosity on his pursuers. The foremost dogs are sure to suffer, several falling by as many strokes. An instance is on record, in which a Boar turned suddenly on a pack of fifty dogs which were pursuing him, and instantly killed

\* Brit. Quad. 359.

six or seven of them, wounding all the rest with the exception of ten." In India, boar-hunting is a favourite and exciting amusement among the European residents. The hunters are always mounted on horseback, and are armed with javelins which they throw at the animal as he runs away, or rushes to the charge; his assaults are frequently so furious that the horses will not stand the shock, or if they do, are thrown down and severely gored. Mr. Johnson has related an instance in which a large and resolute Boar, having been driven by the hunters into a plain, stood at bay, challenging the whole party: he charged every horse that advanced within fifty yards of him, with great ferocity, causing them to rear and plunge, and throw their riders; whose lives were in jeopardy. Though many of the horses were accustomed to the sport, none would sustain the animal's impetuous charges, nor bring their riders within javelin distance, and at length he fairly drove the whole party off the field; then, gnashing his teeth, and foaming, he made his way to the jungle where it was useless to attempt to pursue him further.\*

The food of the Hog, as is well known, consists of acorns, beech-mast, grain, and succulent vegetables; as well as of various fleshy and farinaceous roots, worms, and larvæ, which he ploughs up with his snout: he will hardly refuse any animal or vegetable garbage that falls in his way. In a state of freedom he feeds chiefly by night, retiring by day to his lair, which is remarkably clean and warm, formed in some cave, or beneath the gnarled roots of a tree, and well supplied with dry leaves.

\* Pict. Museum, i. 98.

The usual colour of the Wild Boar is rusty black, or brown, more or less brindled. The females and young associate in herds, but the old boars are for the most part solitary, and very savage.

The domestic Hog, though perfectly useless during life, is perhaps the most important of those which are reared for the value of their flesh as human food. None is so productive; the sow bearing two litters in the year, and having from eight to twelve, or even more young ones at a birth. None converts a given quantity of corn or other nutritious food so soon into fat, or can be made fat on so great a variety of food.

There are several very valuable breeds of Swine in this country, produced by judicious crossings. The largest animals are not the best. Fertility, a capacity of fattening with rapidity and with the least expense, the smallness of the bones, and the firmness and sweetness of the flesh, with its readiness to receive salt,—are objects of higher importance than mere bulk. The small pigs of the Chinese breed are remarkable for productiveness, and the rapidity with which they fatten without enlarging their bone. The Chinese hog is short in the head, with wide cheeks, the ears are erect, the chine is high, and the legs are so short that the belly almost touches the ground. The cross from this variety has been very advantageous to the English breeds.

The Suffolk pig approaches nearest to the Chinese; it is usually white, with the ears pointed and rather forward. It is of a short and compact form, broad in the chest and in the loins. The pigs are very delicate, and at twelve or fifteen months they make excellent bacon.

The Neapolitan hog has also been introduced with success; it is black, without hair, very plump, with pricked ears. No breed can excel it in aptitude to become fat, even on scanty food, but it is of a tender and delicate constitution. A cross between this and the pure black Essex hog, which very closely resembles it, fattens at a very early age, and to an astonishing degree. Of some of this breed, shewn at Smithfield, and which gained prizes for several successive years, it is said that "at twenty-two weeks old they were so completely covered with fat, that their feet were scarcely to be seen; and if they could stand, which is doubtful, it is certain they could not walk."

The Berkshire is a well-shaped hog, with short legs, small ears, broad chines and loins, and good hams. This, crossed with the Neapolitan, produces an excellent variety.

It is a great error to suppose that swine love dirt. With plenty of dry litter, space, and water, the Hog will keep himself scrupulously clean, and will thrive all the better. Even the trouble of washing and currying him frequently will be well repaid.

#### FAMILY IV. RHINOCEROTIDÆ.

(*Rhinoceroses*.)

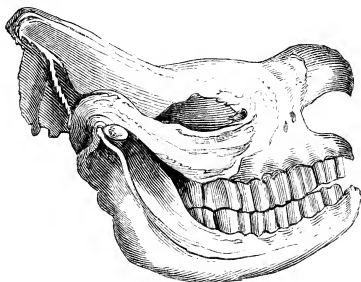
The three living genera, *Rhinoceros*, *Hyrax*, and *Tapir*, which, with some extinct forms, constitute the present Family, have the feet wholly inclosed in the integuments, but tipped with hoofs three or four in number on each foot. They resemble each other in their jaws, all having seven molars on each

side in each jaw, those of the upper having square crowns and various prominent lines, while the crowns of the lower assume the forms of double crescents, except in the hindmost of all, on which the crescent-crown is triple. The canines are either very small or wanting; and the number of incisors varies not only in the different genera, but even in the species of the same genus.

In size, appearance, and habits the genera differ so greatly from each other, that little could be predicated of them in common. Though the total number of species is very limited, they are yet widely scattered over South America, Africa, India and the great Oriental Islands.

#### GENUS *RHINOCEROS*. (LINN.)

The Rhinoceroses are animals of Africa and India, of great size, and massive proportions. There are but three toes on each foot, terminated



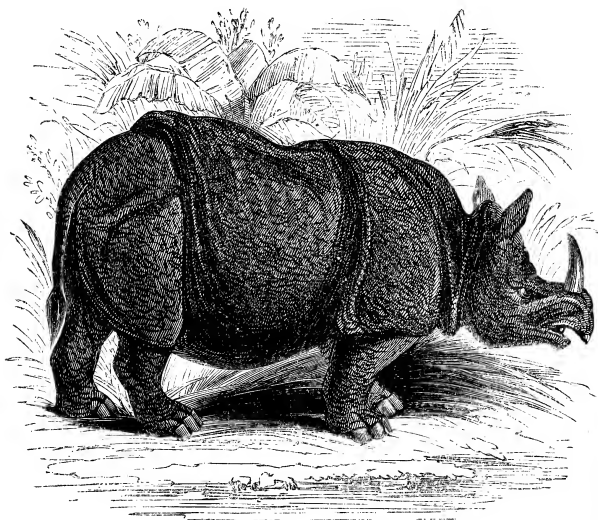
SKULL OF *RHINOCEROS BICORNIS*.

by rounded hoofs. The dental arrangement is as follows in the four Asiatic species,—inc.  $\frac{4}{4}$ ; can.  $\frac{0}{0}$ ;

mol.  $\frac{7-7}{7-7}$ ; = 36; but the African species are destitute of incisors as well as canines. The skull is remarkable for the pointed elevation of the summit, and for the enlargement of the bones of the nose, which are of an unexampled size and thickness; they are united into a kind of arch, overhanging the front of the jaw, and intended to give support to a solid horn, which forms the most obvious characteristic of this genus, being seated on the nose. In all the African species, and in one of the Oriental, there is a second horn; but, totally unlike what prevails universally in other horned quadrupeds, they are not arranged transversely, but longitudinally; the second, which is for the most part very inferior in length, being placed immediately behind its fellow. The horn, or horns, are as peculiar in their structure as in their position. They are not, as in the Ruminants, bony projections, parts of the skeleton, surrounded by skin or by a corneous case; but are solid appurtenances to the skin, composed of parallel fibres, of the nature of hairs, glued together, as it were, into a dense and compact mass. This fibrous texture is very manifest at the base, but at the tip it is less apparent, this part being always worn down by continual rubbing, and bearing a considerable polish.

The skin is excessively thick and coarse, and destitute of hair; and in the Asiatic species, falls in massive folds round the neck, behind and across the shoulders, and before and across the thighs; in these also, it is studded with rounded tubercles; both these peculiarities are wanting in the African species, which might indeed, on many accounts, constitute a separate genus. The Su-

matran species (*R. Sumatranus*, RAFF.) is intermediate in these and other respects. In disposition also, there is a well-marked difference between the animals of the two divisions: the African being characterized by a blind and malignant ferocity, while the Asiatic kinds are dully pacific and inoffensive.



INDIAN RHINOCEROS.

The species which has been the longest and the best known is the single-horned Rhinoceros of continental India, (*R. Indicus*, Cuv.) Both it, and some one of the African kinds, were repeatedly exhibited to the cruel Romans, in the bestial combats of the arena; but in modern

times, Europe has seen no other than the Indian animal, of which, within the last two centuries, no fewer than a dozen individuals have been imported.

Both the peninsulas of India, from Bengal to Cochin China, but more especially that beyond the Ganges, are the native regions of this huge and uncouth quadruped. Like many others of this Order, he delights in the marshy borders of lakes and rivers, the damp and teeming forests, or the swampy jungles; immersing himself in the cool water and mud, or rolling and wallowing in the soft and oozy soil. "He lieth under the shady trees, in the covert of the reed and fens: the shady trees cover him with their shadow, the willows of the brook compass him about."\* Some of our readers may have seen the individual, which for some years has been one of the treasures of the Zoological Gardens in the Regent's Park, luxuriating in the bath with which his paddock is furnished, till his form is disguised beneath a thick coat of adhesive mud. When he can be seen, however, divested of such a covering, his skin is found to be of a dull, deep purplish hue, marked with elevated round knobs, and other inequalities, and doubled into the thick folds already alluded to. There is no hair on the body, but on the tail and ears are a few stout and stiff horny bristles. Most visitors are disappointed at the appearance of the nasal horn in this specimen; it seems a coarse knob or lump, rather than a horn, the height being less than the diameter; but in fact, the animal has, ever since the first growth of the excrescence, constantly employed itself with

\* Job xl. 21, 22.

untiring diligence in rubbing it down, so as to prevent its natural increase. In a state of nature, however, it is a formidable weapon. Pennant mentions a Mr. Pigot, an acquaintance of his own, "who had his belly ripped up by one, but survived the wound."

"Sluggish in his habitual movements, the Rhinoceros wanders through his native plains with a heavy step, carrying his huge head so low that his nose almost touches the ground, and stopping at intervals to crop some favourite plant, or, in playfulness, to plough up the ground with his horn, throwing the mud and stones behind him. The jungle yields before his weight and strength, and his track is said to be often marked by a line of devastation." In captivity it has generally been found to be peaceable, and tolerably tractable, but subject to fits of violence. The specimen seen by Dr. Parsons, in England, in 1739, often became unruly, and could be appeased only by food. When he was hungry, or irritated, he would spring forward, rear himself up, and push violently with his head against the walls. And the individual now in possession of the Zoological Society, is occasionally thrown into a state of excitement by the noise produced by the roller upon the gravel-walk, charging down towards it, and rearing himself up against the fence with great violence.

Bontius, who appears to have been familiar enough with this species in India, records the following instance of its fury when provoked. "A party on horseback had proceeded to a wood, when, in a marshy place, they came upon a Rhinoceros and her young one. The mother, on

seeing them, arose and drove her young one towards the wood, and when it stopped in its play, pushed it forward with her snout. One of the company, out of a bravado, rode up, and drawing his Japanese sword, cut at the hinder parts of the old one, but the blows did not penetrate, on account of the hide, and some whitish marks only appeared. The mother bore all patiently till her young one was safely hidden in the bushes and brushwood. Then the scene was changed. The irritated beast turned suddenly on her persecutor, whose life was saved by his frightened horse, which galloped back to the party, pursued by the furious Rhinoceros overturning trees and everything in her way.

“As soon as she saw the rest of the company, she attacked them; but they avoided her by getting behind two great trees, scarcely two feet apart, between which the Rhinoceros, in the blindness of her rage, rushed, making them tremble like reeds. While she was thus entangled, they used their fire-arms with fatal effect, and slew her. The rash man who attacked her by himself had a very narrow escape; for she turned short upon him with a horrible roar, and seized him by the boot, which, fortunately for him, was made of slight materials, and gave way. But for its yielding, *actum de eo fuisset* (says the worthy traveller), his affairs would have been soon settled.”

The natural food of the Rhinoceros consists of various kinds of herbage, and succulent plants, with the tender branches of trees; which he collects by means of his extensible upper lip. The specimen described by Dr. Parsons, was fed in captivity with seven pounds of rice daily, mixed

with three pounds of sugar; with hay and green herbs added. That exhibited in 1790, which afforded the interesting memoir by Mr. Bingley, in his "Animal Biography," was allowed twenty-eight pounds of clover, about the same quantity of ship biscuit, and a great quantity of greens daily. Twice or thrice a day, five pails of water were given him. He was fond of sweet wine, and would drink three or four bottles in a few hours. We may presume this to have been on extraordinary occasions.

The Rhinoceros and the Elephant, in the Gardens, have lived on the best possible terms together, never having manifested any animosity towards each other. Major Lally, however, once witnessed from a distant hill in India a most desperate encounter between a large male Elephant and a Rhinoceros, in which the former was vanquished, and compelled to flee.

## FAMILY V. EQUIDÆ.

(Horses.)

The last family of the *Pachydermata* differs much from the other forms of the group. Instead of the massive contour and heavy tread of the Elephants and Rhinoceroses, we find in the Horses an approach to the slender forms, graceful proportions, and fleet motions of the Deer and Antelopes. The neck and limbs are considerably elongated: each foot terminates in a single apparent toe, formed by the two middle toes soldered, as it were, into one, which is enclosed in a rounded, horny hoof. But though there is only one toe developed,

there are, on each side, two small rudimentary bones, which represent two lateral toes.

The teeth are thus arranged: inc.  $\frac{6}{6}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{7-7}{6-6}$ ; = 42. The incisors, during youth, have their crowns furrowed with a groove; the molars have square crowns, marked with four crescents of enamel, the ends of the *laminæ* which penetrate them. The canines are developed only in the male sex: between them and the first molar, there is a broad open space, admitting the operation of the bit, with which man governs these powerful and useful animals in a state of discipline. The stomach is simple, and incapable of rumination, but as the natural food consists exclusively of herbage, the intestines are greatly lengthened, to permit a more perfect extraction of the nutrition contained in it. One young one, called a foal, is ordinarily produced at a birth, which is suckled during six or seven months: the *mammæ* of the female are situated between the posterior limbs.

Africa and Asia are the native regions of the animals of this family; which, associating in numerous herds, range over the vast plains and tablelands, which are unincumbered with forests. Two species, however, the Horse and the Ass of domestication, have been widely dispersed over the earth by man.

#### GENUS *Equus*. (LINN.)

The few species, (not exceeding ten,) which are known to belong to the family under consideration, have so many characters in common, that many zoologists of high reputation consider them as constituting but one genus. Mr. Gray, how-

ever, who has been followed by Mr. Bell, separates the Asses, (including all the species but one,) under the generic name of *Asinus*, leaving the Horse, the valued associate and servant of man, alone to fill the Genus *Equus*. Colonel Hamilton Smith further separates the striped South African species from the other Asses, by the name of *Hippotigris*; but this seems a needless division.

The Horse, then, is generically distinguished by the mane and tail being full and flowing, the long hairs on the latter covering it from the insertion to the extremity; there is no dark line running along the centre of the back, nor any bands on the body or limbs, the tendency of the colours being rather to form round spots; and the hinder as well as the fore legs are marked on the inner surface with rough, callous warts.

From very early times, the Horse (*Equus caballus*, LINN.) has been in the service of man. The Sacred Scriptures, as well as the undying monuments of Egyptian antiquity, shew that its value as an animal of draught, and as an auxiliary of war, was well appreciated by the powerful and politic Pharaohs. Whether it exists anywhere in a truly wild condition, is very doubtful: herds of horses in a state of freedom scour the steppes of Tartary from Russia to China, and others snuff up the wind on the prairies of Texas, and on the Pampas of La Plata; but these latter, we know, are the emancipated descendants of the domestic horses introduced by the European colonizers of America; and we strongly suspect that the more savage breeds of Central Asia have a similar lineage; though a much more protracted continuance of freedom may have impressed more strongly the

characteristics of original wildness upon them than upon their recently escaped American brethren.

Col. H. Smith, on information derived from various persons familiar with the Tartar horses, and in particular from a Cossack, who was "a perfect model of an independent trooper of the desert, and who had spent ten or twelve years on the frontier of China," considers that there is upon the steppes a true wild race, as well as a feral or emancipated one, and that the habits of the one are so distinct from those of the other, that the two kinds are distinguished by name; the feral horse being denominated *muzin*, the wild *tarpan*. The latter are said to be irreclaimable; when captured they often break their necks in their violent struggles, and, if not, they pine and die. In fighting they rise up, strike with the fore feet, try to crush their adversaries, and bite with much ferocity.

On the vast plains of South America the horses have increased prodigiously; they scour the sea-like country in troops of thousands. In a certain sense, however, these are not free; for a nominal ownership over them is claimed, according to the proprietorship of the lands on which they feed. Large enclosures, called *corrals*, are formed, into which they are occasionally driven for the purpose of slaughtering them, the hides being a valuable object of commerce. When required for the saddle, the horses are caught by means of the lazo, in which the Gauchos or native inhabitants are very expert, even from childhood. The lazo is a plaited thong, half an inch in diameter, and forty feet in length, composed of several strips of hide properly cured, intertwined, and rendered supple

by grease. At one end is an iron ring, through which the thong is passed so as to make a running noose. The lazo is used on horseback principally; one end being fastened to the saddle, the Gaucho carries the rest, carefully coiled, in his left hand, leaving about four yards of the noose end in a coil; half of this he holds in his right hand, swinging the noose horizontally round his head; the weight of the iron ring giving it sufficient impetus, when launched, to carry out the whole length of the line. Such is the dexterity of these people, that the noose is lodged with unerring precision on any part of the animal at which they hurl it, round the head and neck, round one leg, or two legs, or round the horns of a bull; and, as the horses are trained to lean over on the opposite side at the moment of the strain, the most powerful wild animal is suddenly arrested and thrown upon the ground in the midst of its fierce career.

The capturing and breaking of wild horses have been described by many travellers in interesting terms: we select the following from Mr. Darwin's Journal. "One evening a *domidor*, or subduer of wild horses, came for the purpose of breaking in some colts. A troop of young wild horses is driven into the *corral*, or large enclosure of stakes, and the door is shut. We will suppose that one man alone has to catch and mount a horse, which as yet had never bridle or saddle. I conceive, except by a Gaucho; such a feat would be utterly impracticable. The Gaucho picks out a full-grown colt, and as the beast rushes round the circus, he throws his lazo so as to catch both the front legs. Instantly the horse rolls over

with a heavy shock, and while struggling on the ground, the Gaucho, holding the lazo tight, makes a circle so as to catch one of the hind legs just beneath the fetlock, and draws it close to the two front. He then hitches the lazo so that the three legs are bound together; then, sitting on the horse's neck, he fixes a strong bridle without a bit to the lower jaw; this he does by passing a narrow thong through the eye-holes at the end of the reins, and several times round both jaw and tongue; the two front legs are now tied closely together with a strong leathern thong, fastened by a slip knot. The lazo which bound the three together being then loosened, the horse rises with difficulty; the Gaucho, now holding fast the bridle fixed to the lower jaw, leads the horse outside the corral. If a second man is present (otherwise the trouble is much greater), he holds the animal's head while the first puts on the horse-cloths and the saddle, and girths the whole together. During this operation, the horse, from dread and astonishment at being thus bound round the waist, throws himself over and over again on the ground, and till beaten, is unwilling to rise. At last, when the saddling is finished, the poor animal can hardly breathe from fear, and is white with foam and sweat. The man now prepares to mount by pressing heavily on the stirrup, so that the horse may not lose its balance; and at the moment he throws his leg over the animal's back, he pulls the slip knot, and the beast is free. Some domidors pull the knot while the animal is lying on the ground, and, standing over the saddle, allow it to rise beneath them; the horse, wild with dread, gives a

few most violent bounds, and then starts off at full gallop: when quite exhausted, the man, by patience, brings him back to the corral, where, reeking hot, and scarcely alive, the poor beast is set free. Those animals which will not gallop away, but obstinately throw themselves on the ground, are by far the most troublesome: this process is tremendously severe, but in two or three trials the horse is tamed.

“The Gauchos are well known to be perfect riders: the idea of being thrown, let the horse do what it likes, never enters their head: their criterion of a good rider is a man who can manage an untamed colt, or who, if his horse falls, alights on his own feet, or can perform other such exploits. I have heard of a man betting that he would throw his horse down twenty times, and that nineteen out of these he would not fall himself. I recollect seeing a Gaucho riding a very stubborn horse, which three times reared so excessively high as to fall backwards with great violence. The man judged with uncommon coolness the proper moment for slipping off, not an instant before or after the right time. Directly the horse rose, the man jumped on his back, and at last they started at a gallop. The Gaucho never appears to exert any muscular force. I was one day watching a good rider, as we were galloping along at a rapid pace, and thought to myself, surely, if the horse starts, you appear so careless on your seat you must fall. At this moment a male ostrich sprang from its nest right beneath the horse's nose. The young colt bounded on one side like a stag; but as for the man all that could be said was, that he started and took fright as part of his horse.”



HORSES.

To the estimation in which this noble animal is held by all civilized and by many barbarous nations, it is unnecessary to do more than allude. Many breeds have peculiar excellences; those of this country, through long continued attention, combined with skill and science, may probably be considered with fairness, as inferior to none in the world. Domestication has produced its usual result in forming widely different varieties of this useful creature, from the diminutive Shetland pony, strong and hardy, though scarcely larger than a dog, or the taper-limbed Racer, to the massive and gigantic Dray-horse of the metropolitan brewer. "In this country," observes Mr. Bell, "the horse has always been an object of the highest interest; and our ancestors were, from the earliest period, celebrated for the excellence of their breeds of this useful animal. When Cæsar landed on the shores of Kent he was received by the cavalry and war-chariots belonging to the defending army. How long before this period the barbarous inhabitants of our island had known the use of this powerful constituent of the material of an army, is of course beyond the limits of conjecture; but from this time, occasional mention is made of the excellence of British horses."

The horse is capable of strong attachment to man, and to other animals. Many interesting anecdotes are on record of this. Mr. Jesse relates the following. "A horse and a cat were great friends, and the latter generally slept in the manger. When the horse was going to have his oats, he always took up the cat gently by the skin of her neck, and dropped her into the next stall, that she might not be in his way, while he was

feeding. At all other times he seemed pleased to have her near him."

"Two Hanoverian horses had long served together during the Peninsular war, in the German brigade of artillery. They had assisted in drawing the same gun, and had been inseparable companions in many battles. One of them was at last killed; and after the engagement the survivor was picqueted as usual, and his food brought to him. He refused, however, to eat; and was constantly turning round his head to look for his companion, sometimes neighing as if to call him. All the care that was bestowed upon him was of no avail. He was surrounded by other horses, but he did not notice them; and he shortly afterwards died, not having once tasted food from the time his former associate was killed. A gentleman who witnessed the circumstance assured me that nothing could be more affecting than the whole demeanour of this poor horse."\*

\* Gleanings in Nat. Hist. pp. 256, 102.



## ORDER VII. RUMINANTIA.

(*Ruminating Animals.*)

The distinctive characters of the animals of this Order are so strongly marked as to have been recognised in very early times. Even at the era of the Deluge we find a certain number of animals separated from the rest as “clean;” and at the giving of the Law these are defined in the following terms:—“Every beast that parteth the hoof, and cleaveth the cleft into two claws, and cheweth the cud,—.”\* The Camels, it is true, exhibit some deviation from the common characters, forming the link of connexion with the order we have just relinquished; but with this trifling exception the cloven-footed Ruminants constitute a group of *Mammalia* remarkably compact, natural, and well-defined.

Each of the feet is terminated by two toes, encased in two hoofs, sharp-pointed, and presenting a flattened surface to each other, as though a single rounded hoof had been cleft. Behind the hoofs, there are two small spurs, which are the rudiments of lateral toes.

The faculty of rumination, or chewing the cud, is the most remarkable possessed by these animals: the vegetable food, swallowed almost as taken into the mouth, is returned after a while to undergo a second mastication, so as to fit it

\* Deut. xiv. 6.

for a more perfect digestion. In connexion with this power we must mention the complex character of their stomachs, which are four in number, each having a distinct structure and function; and the first three of which are so disposed that the food can enter at the will of the animal into either of them, the gullet terminating at the point of communication.

The first stomach or paunch (*rumen*) is, in the full grown animal, the largest of all, but not so in the new-born young. It is externally divided into two bag-like appendages at its extremity, and it is slightly separated into four parts internally. The interior surface is beset with innumerable flattened warts (*papillæ*). The mass of herbage, rudely bruised by the teeth, is received into this stomach, whence it is transmitted to the second, called the honey-comb bag (*reticulum*). This is small and globular, and may be considered as an appendage to the paunch, but is distinguished from it by the *laminæ* which stand up from its inner surface, dividing the whole into elegantly-arranged hexagonal cells, like those of a honey-comb. The food is here arrested, moistened, and compressed into small pellets, which are successively returned to the mouth to be rechewed, an operation usually performed during the repose of the animal, and evidently attended with much enjoyment.

Thus completely masticated, it again passes through the *æso-phagus*, and is received by the third stomach, called the manyplies (*psalterium*), the inner coat of which is also set with *laminæ*, but running down longitudinally parallel with each other, so close and numerous as to resemble

the leaves of a book. In the sheep there are about forty of these leaves, and in the ox as many as a hundred.

Thence the food passes into the fourth stomach, commonly known as the red (*abomasus*), which is of considerable size, of a lengthened pear-like form, and having a hairy inner surface, with many large longitudinal wrinkles. This is the seat of digestion, properly so called: in the sucking young, it is the largest of the four.

The mode of acting of this complicated organ, Blumenbach has explained. The first three stomachs are connected with each other, and with a groove-like continuation of the gullet (*œsophagus*), in a very remarkable way. The latter tube enters just where the paunch and the second and third stomachs approach each other; it is then continued with the groove, which ends in the third stomach. This groove is therefore open to the first stomachs, which lie to its right and left. But the thick prominent lips which form the margin of the groove admit of being drawn together, so as to form a complete canal, which then constitutes a direct continuation of the gullet into the third stomach. The functions of this very singular part will vary according as we consider it in the state of a groove or of a closed canal. In the first case, the grass is passed, after a very slight mastication, into the paunch, as into a reservoir. Thence it goes in small portions into the second stomach, from which, after a further maceration, it is forced into the gullet and thus returned into the mouth. On being again swallowed, the groove is shut, and the morsel of food is thereby conducted into the

third stomach. During the short time that it probably remains between the folds of this division, it is still further prepared for the process of digestion in the true stomach. The structure of the groove thus proves that the operation is subject to the will of the animal, and it is expressly stated of some men, who have had the power of ruminating, (instances of which are not very rare,) that it was quite voluntary with them. "I have known," continues Blumenbach, "two men who ruminated their vegetable food; both assured me that they had a real enjoyment in doing this; which has also been observed of others: and one of them had the power of doing it, or leaving it alone according to circumstances."

The importance and interesting character of this operation, which is one of the most remarkable deviations from the ordinary economy of the *Mammalia*, will plead our excuse for the minuteness with which we have considered it.

The incisor teeth in the lower jaw are commonly eight in number, but in the upper are wanting; a callous pad, the hardened gum, receiving the pressure of the lower cutting teeth. Canines are found in some genera only. Six molars are on each side, both above and below, the crowns of which are marked with double crescents of enamel.

In by far the greater number of genera, true horns are found, at least in the male sex, which are bony prominences, projecting, one on each side, from the frontal portion of the skull.

The food of the whole Order is exclusively vegetable, and grass and similar herbage constitutes the greatest proportion of it. Hence their flesh forms wholesome and agreeable food to man, who

in this respect is more indebted to the *Ruminantia*, than to the whole animal kingdom besides. Their milk also, both in a crude state and in the form of butter and cheese, forms an important article of human diet; and their fat, (which becomes very solid when cold,) their horns, hides, hair, or wool, and bones, are all turned to useful account in the arts of civilized life. Some of the genera emulate, if they do not surpass, even the *Equidæ*, as beasts of burden and of draught.

The species of this order are widely scattered all over the world, with the exception of Australia. They are arranged in five families, *Camelidæ*, *Moschidæ*, *Cervidæ*, *Capradæ*, and *Bovidæ*.

## FAMILY I. CAMELIDÆ.

(*Camels.*)

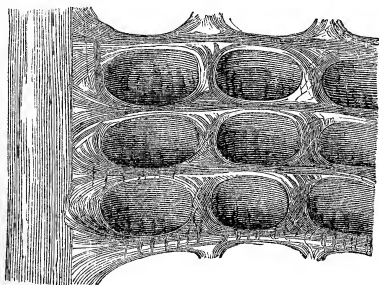
We have said that this Family deviates in some of its characters, from the rest of the Order. "Instead of having short and abruptly truncated toes, completely enveloped in large hoofs, flattened internally, and forming the sole basis on which the animal rests in progression, the Camels and the Llamas have their toes elongated forwards, and terminating in small horny appendages, surrounding the last phalanx [or joint] alone, rounded above and on either side, and somewhat curved, while the under surface of the foot on which they tread is covered only by a thickened callous skin."\*

The *Camelidæ* have canines in both jaws; and, contrary to what prevails in the Order, two inci-

\* Bennett's Gard. and Menag. of Zool. Soc. i. 274.

sors in the upper jaw : the number of incisors below is six ; and there are six molars on each side in the upper jaw, and five in the lower, the anterior one of which, small and separated from the rest by a wide space, takes the form of an additional canine. This is, however, wanting in the Llamas.

Besides the usual ruminating structure of the stomachs, the Camels have a peculiar development for the reception and retention of water during long abstinence. "The paunch," observes Mr. Martin, "is divided into two portions by a longitudinal ridge of muscular fibres ; in the left is a series of deep cells capable of containing (in the Arabian Camel) four or five quarts of water ; in the right is a smaller series holding about a quart. When these cells are



CAMEL'S STOMACH.

filled, the fluid is kept free from mixture with the food by the contraction of the orifice of each cell, and it can be forced out at pleasure by the action of a muscular expansion covering

the bottom of this cellular apparatus. The deep cells of the *reticulum*, are arranged in twelve rows, and are formed by muscular bands intersecting each other transversely. This compartment in the Camel appears to be destined exclusively as a reservoir for water, never receiving solid food, as in the Ox or Sheep." Sir E. Home observes, "It would appear that Camels, when accustomed to journeys in which they are kept for an unusual number of days without water, acquire the power of dilating the cells, so as to make them contain a more than ordinary supply for their journey." Though this structure has been commonly considered as peculiar to the true Camels, Dr. Knox has shown that the Llamas possess a similar apparatus.

The remaining characters of the *Camelidæ* are the absence of horns, the great length of the neck, the comparatively small size of the head, the prolongation and mobility of the upper lip, which is deeply cleft by a vertical fissure, and the absence of a naked muzzle, the nostrils forming merely two transverse slits in the skin, which can be closed at the will of the animal.

There are but two genera, one of which is confined to the sandy deserts and arid plains of the Eastern Hemisphere, and the other to the rocky ridges of the Andes in the Western.

### GENUS *CAMELUS*. (LINN.)

The true Camels are distinguished by possessing a broad callous pad or sole, by which the toes, free and separable above, are connected beneath, which is wanting in the American genus; and by the

presence of one or more large bunches or humps of fatty substance on the back, giving an uncouth and even grotesque appearance to them, in the estimation of such as are not familiar with them. But, bearing in mind that these animals are intended to be the beasts of burden in immense



CAMEL IN SAND-STORM.

sandy deserts, where for hundreds of miles there is neither vegetation nor water, we perceive in their strange structure but another admirable instance of the wisdom of God, “wonderful in counsel, and excellent in working.” “The problem being proposed to construct an animated ma-

chine that should be best calculated to meet the exigencies of the animal, where could we find a better solution of it than in the construction of the Camel? The pads, or sole-cushions of the spreading feet, are divided into two toes without being externally separated, which buoy up, as it were, the whole bulk with their expansive elasticity from sinking in the sand, on which it advances with silent step,—the nostrils so formed that the animal can close them at will, to exclude the drift-sand of the parching simoom;—the powerful upper incisor teeth for assisting in the division of the tough prickly shrubs and dry stunted herbage of the desert;—and above all, the cellular structure of the stomach, which is capable of being converted into an assemblage of water-tanks,—bear ample testimony to the care manifested in the structure of this extraordinary quadruped.” \*

The head of the Camel is long and somewhat uncouth; placed at the end of a lengthened but ungraceful neck; the orbits of the eyes are protuberant; the ears are small; the upper lip is tumid and cleft. There are callous bosses upon the breast, and upon the bending points of the limbs; a provision for the protection of the animal, when it kneels or lies down upon the burning sand, for repose, or for the reception of its burden.

The Arabian Camel (*Camelus dromedarius*, LINN.) the species best known to us, is distinguished from its only congener by having but a single hump upon the back, by being rather smaller, and more slightly made, and by the hair being less profuse and closer. Its colour is usually pale brown, but individuals are seen cream-coloured or white. We

\* Penny Cycl. Art. CAMEL.

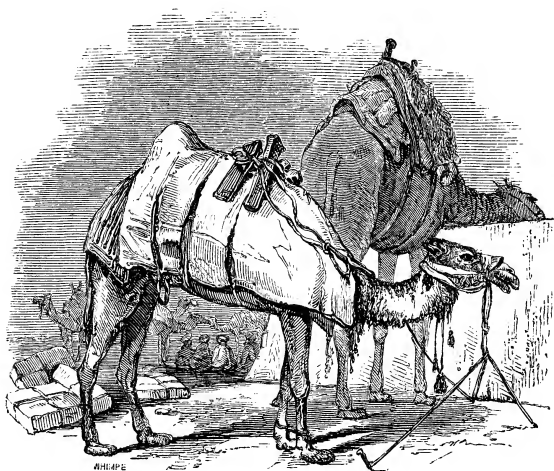
know nothing of this animal in a wild condition, but in a domesticated state it has existed from the earliest times in Egypt, Arabia, Palestine, and the neighbouring countries. Herds of these useful creatures formed no small part of the pastoral wealth of the venerable patriarchs: Job had six thousand camels;\* and they are mentioned among the acquisitions of Abram on his first visit to Egypt.† Probably the geographical range of the species has scarcely varied from those times till the present: it now spreads over the whole of Northern Africa and Southern Asia, as far as Hindostan; it has been introduced also into Italy and into the Canary Isles.

The frightful deserts of ever-shifting sand which occupy so large a space of this region, well described in Scripture as “that great and terrible wilderness,” and as “waste, and howling,”—would be perfectly impassable but for the aid of this invaluable animal. Trackless and limitless, bounded everywhere by the horizon, the unstable surface ever moved and tossed by the wind, and often raised by storms into overwhelming billows, they suggest an unavoidable idea of the ocean; while the tall and ungainly animal which patiently bears its freight of human life and property across the desolation, has obtained, not from Europeans only, but even from wide-scattered tribes of Arabs, the poetical appellation of “the ship of the desert.” Numerous caravans of these animals, each burdened with a load of five or six hundred pounds’ weight, and arranged in long strings, patiently pursue their toilsome way beneath the scorching sun, at the rate of about twenty-four

\* Job xlii. 12.

† Gen. xii. 16.

miles a day. Often, in dry seasons, the wells, which here and there have been dug at long intervals, are found to be destitute of water, when the most appalling privations are sometimes suffered



HALT OF A CARAVAN.

by man and beast: on such occasions, the extreme exigency has prompted the slaughter of the Camel, for the sake of the pittance of water contained in its natural reservoir already alluded to. If, however, abstinence from drinking have been maintained for four or five days, the Camel's internal supply becomes exhausted, and thirst speedily proves fatal.

From its birth, the Camel is trained to kneel, and to receive very heavy loads, at command: its

docility is extreme, and it is only in cases of unreasonable oppression that it expresses a sense of injustice by loud cries of complaint. When an overloaded Camel, exhausted with hunger or thirst, sinks down in the desert, it seldom rises again, but must be left to its fate, which is sure and speedy. The vultures quickly begin to collect and wheel round above their victim, impatient to begin their repast; and the skeleton soon adds another to the many, which, bleached by the sun to a dazzling whiteness, are scattered over every part of the tawny wilderness.

There is probably as much difference between the various breeds of Camels, as between those of Horses with us; strength, capacity of endurance, and fleetness, being found in diverse proportions. The Dromedary (the *Heirie* of the Arabs) is a very light and swift breed, used for carrying a rider a long distance in very short periods of time. Though a fleet horse would quickly leave the heirie behind, the power of sustaining exertion would enable the latter to regain his lost ground, and to continue his unabated course long after his rival had become exhausted. Wellsted says that it can maintain a speed of six or eight miles an hour, for twenty-four successive hours.

The flesh and milk of the Camel are important parts of an Arab's diet: its long hair, somewhat woolly in texture, is woven into garments and tents; and the finer hair is imported into Europe for the manufacture of artists' pencils. The best is obtained from Persia.

## FAMILY II. MOSCHIDÆ.

(Musks.)

The little group which constitutes this Family is named from the circumstance of one species of it producing the well-known perfume called musk. They differ but slightly from the Deer in general form, but their limbs are much more taper, and their hind quarters considerably elevated; their face also is narrow and lengthened, and they are destitute of horns. Their dentition is peculiar; they have eight incisors below, and a vacant space answering to them above, as in most *Ruminantia*; there are also six molars on each side both above and below, but their crowns bear distinct tubercles, and the first in the upper, and the first and second in the lower jaw present cutting edges and points, similar to those of the *Carnivora*. In each upper jaw there is a canine, which is so lengthened as to project from the mouth in the form of tusks, slightly curved backwards. Those of the true Musk (*Moschus moschiferus*, LINN.) are three inches in length. None of the species possess cavities beneath the inner angles of the eyes, common in the Deer and Antelopes, nor tufts of bushy hair on the legs. The eyes are large and full; the ears rather small; the tail short. There are accessory hoofs behind the two principal ones, but these are for the most part very small, straight, and placed high above the ground.

The species are almost confined to Eastern Asia, and the adjacent islands; but one has re-

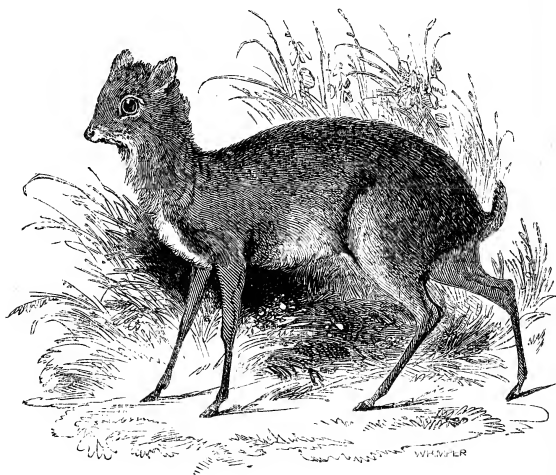
cently been discovered in Western Africa, whose habits are more aquatic than those of its fellows.

GENUS *TRAGULUS*. (GRAY).

We select this genus for illustration because it contains the most elegant and, with one exception, the smallest of all the *Ruminantia*. It is distinguished by having the hinder edge of the foot (*metatarsus*) nearly destitute of hair, and slightly callous, a character peculiar to this genus. The fur is soft and pressed close to the body, never spotted even in youth. Beneath the throat is a somewhat naked, concave, callous disk, from which a band extends to the chin. There is no musk-bag. Most of the species have three diverging bands of white on the chest. They inhabit the islands of Java and Sumatra.

The Kanchil (*Tragulus kanchil*, RAFF.) is about the size of a hare, but stands much higher on the legs, which are exceedingly slender. It inhabits the deep and mighty forests of Java, where it feeds principally on berries. It seems among the inhabitants of the island to possess a similar reputation for strategy, to that of the Fox in Europe. It is a common Malay proverb to describe a great rogue as being "as cunning as a kanchil," and Sir Stamford Raffles relates some of the reported instances of this cleverness. "If taken in a noose laid for it, the Kanchil, when the hunter arrives, will stretch itself out motionless, and feign to be dead; and if, deceived by this manœuvre, he disengage the animal, it seizes the moment to start on its legs, and disappears in an instant. A still more singular expedient

is mentioned, viz., that when closely pursued by dogs, the Kanchil will sometimes make a bound upwards, hook itself on the branch of a tree by



KANCHIL.

means of its bent tusks, and there remain suspended, till the dogs have passed beneath."

### FAMILY III. CERVIDÆ.

(Deer.)

The Deer form a numerous, widely-extended, and extremely natural Family of quadrupeds. They possess bony horns, which are very rapidly produced, fall off, and are reproduced at regular

periodical intervals. This "single character," observes Mr. Bell, "of deciduous osseous horns, without any corneous covering, is at once so tangible and so important, as to leave no doubt as to the relation of any one species of the whole group." The horns are in all cases when fully developed, either spread into broad palms, irregularly indented at the edge, or divided into branches, or both; and with the exception of the Reindeer or Caribou (*Rangifer*) are confined to the male sex.

The form of these animals is graceful and elegant, though somewhat compact and plump. Their limbs are slender, but strong; and they are distinguished for agility and fleetness, and, in particular, for the enormous bounds which they are capable of performing. There are cavities beneath the eyes, which secrete a wax-like substance of strong odour, and which are occasionally applied to substances, apparently to test their qualities, in some manner to us unknown.

The geographical range of the Deer embraces the whole world, with the exception of Australia and Southern Africa. The species which inhabit the colder regions are marked in general by superior size, and by a greater development of the horns.

#### GENUS *CERVUS*. (LINN.)

In the Stags the horns are not palmated, but branched, three antlers proceeding from the main stem or *beam*, called respectively the *brow-antler*, the *bez-antler*, and the *antler-royal*, besides the snags or *crown*, called also the *sur-royal*, into which the *beam* divides at its termination. The

males have canine teeth: the cavities beneath the eyes are large and distinct; the muzzle is naked.

The Stag, Hart, or Red-deer of our own island, (*Cervus elaphus*, LINN.) is the only species of the genus found in Europe, but others inhabit North



STAG.

America, and several more occur in India and the Oriental Islands. In England, the gradual disappearance of the great forests, which in former times sheltered immense numbers of wild animals, has caused the Stag to be rarely seen, except in a

few of the larger parks and chaces; but on the mountain-ranges of Scotland, and particularly in the vast forest of Athol, large herds yet remain. "In the glens of the Tilt and Bruar," observes Mr. Martin, "these deer are often seen in herds of upwards of a thousand; and when, in a tract where there is no human abode for twenty or thirty miles, a long line of stags appears on a height with their branching horns relieved upon a clear mountain sky, the sight is very imposing."\*

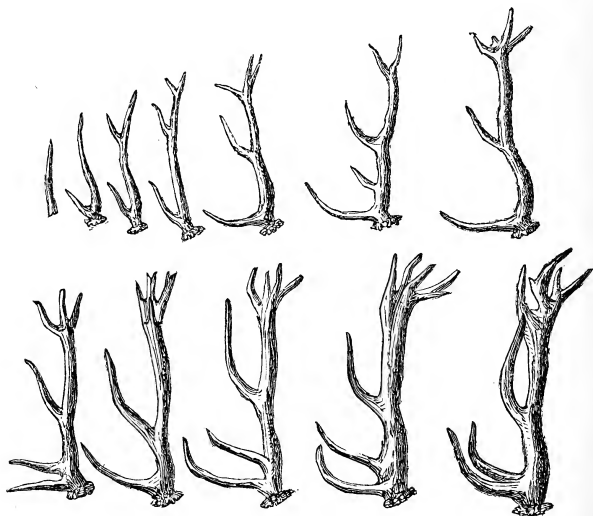
The chace of the Hart was formerly among the most highly esteemed of rural sports; and a noble breed of dogs, the old Stag-hound, was devoted to this pursuit, which is now falling into disuse. In the northern portion of this island hunting has given place to deer-stalking; the sportsman endeavouring with much caution to approach the herd without being perceived until he can bring down his victims with the rifle.

The horns, of which the female, called a Hind, is destitute, are shed in the spring, the old ones losing them first. During the summer they are reproduced, each year (up to a certain period of life) larger than before. Their growth is very rapid; a full-grown horn weighs about twenty-four pounds, the whole of which mass of bone is produced in about ten weeks. The process is so curious and interesting, that our readers will peruse with pleasure the following luminous description of it from the pen of Mr. W. C. L. Martin.

"The horns are seated upon an osseous peduncle or footstalk, rising from each frontal bone, at its

\* Pictorial Mus. i. 135.

central point of ossification; these peduncles are enveloped in skin. It is not until the spring or beginning of the second year, that the first pair of horns begin to make their appearance. At this epoch a new process commences; the skin enveloping the peduncles swells, its arteries en-



SPECIMENS OF STAG'S HORNS, IN SUCCESSIVE DEVELOPMENT.

large, tides of blood rush to the head, and the whole system experiences a fresh stimulus. The antlers are now budding; for on the top of these footstalks the arteries are depositing layers of osseous matter, particle by particle, with great rapidity: as they increase, the skin increases in an equal ratio, still covering the budding antlers; and

continues so to do until they have acquired their due development and solidity. This skin is a tissue of blood-vessels, and the courses of the large arteries from the head to the end of the antlers are imprinted on the latter in long furrows, which are never obliterated. In ordinary language, the skin investing the antlers is termed velvet, being covered with a fine pile of close short hair. Suppose, then, the antlers of the young deer now duly grown, and still invested with this vascular tissue; but the process is not yet completed. While this tender velvet remains the deer can make no use of his newly-acquired weapons, which are destined to bear the brunt of many a conflict with his compeers: it must, therefore, be removed, but without giving a sudden check to the current of blood rolling through this extent of skin, lest by directing the tide to the brain, or some internal organ, death be the result. The process then is this:—as soon as the antlers are complete (according to the age of the individual), the arteries at their base, where they join the permanent footstalk (always covered with skin) begin to deposit around it a burr, or rough ring of bone, with notches through which the great arteries still pass. Gradually, however, the diameter of these openings is contracted by the deposition of additional matter; till at length the great arteries are compressed as by a ligature, and the circulation is effectually stopped. The velvet now dies for want of the vital fluid; it shrivels, dries, and peels off in shreds, the animal assisting in getting rid of it by rubbing his antlers against the trees. They are now firm, hard, and white; and the stag bears them proudly, and brandishes them in de-

fiance of his rivals. From the burr upwards these antlers are now no longer part and parcel of the system, they are extraneous, and held only by their mechanical continuity with the footstalk on which they were placed; hence their deciduous character; for it is a vital law that the system shall throw off all parts no longer intrinsically entering into the integrity of the whole. An absorptive process soon begins to take place just beneath the burr, removing particle after particle, till at length the antlers are separated and fall by their own weight, or by the slightest touch, leaving the living end of the footstalk exposed, and slightly bleeding. This is immediately covered with a pellicle of skin, which soon thickens, and all is well. The return of spring brings with it a renewal of the whole process with renewed energy, and a finer pair of antlers branches forth." \*

In the Muntjaks (*Stylloceros*), a genus inhabiting the Indian islands, the peduncles on which the horns are placed, are greatly lengthened, and in the Giraffe, which seems to belong to this Family, these peduncles alone remain, surmounted by a tuft of hair. By these we are conducted to the verge of the following group, where the horns are permanent.

#### FAMILY IV. CAPRADÆ.

(Goats, &c.)

Although between an Ox and a Goat or Sheep, there seems at first sight a sufficiently obvious

\* Pict. Museum, i. 130.

difference to constitute them of distinct families, it is by no means easy to define such groups by precise characters. The immense assemblage of animals, principally from Africa, which have been thrown together under the common name of Antelopes, greatly increase the difficulty, for while they are connected together by slight and easy gradations, they seem to defy the attempt to link them by any common characters, however loose, which will exclude on the one hand the Ox, and on the other the Goat.

Waiving, then, the further consideration of the Antelopes, we may describe the Goat and Sheep as having permanent horns in both sexes, formed of hollow wrinkled, angular sheaths of corneous substance, supported by a core or process of bone, which is very porous and full of cavities communicating with the interior of the skull. The muzzle is comparatively narrow, without any naked space around the nostrils; the tail is short; there are no fissures beneath the eyes, nor tufts of hair upon the knees.

The Goats and Sheep are remarkably sure-footed; at home upon the craggy pinnacles of lofty mountains, they leap from point to point with the utmost confidence, and find safety on projections and ledges barely sufficient for their hoofs to cover. The species, about whose distinctions there is much uncertainty, inhabit the highest and most inaccessible mountain chains, as the Alps, the Atlas, the Caucasus, and the Himalaya, in the Old World, and the Rocky Mountains in the New. In a state of domestication they have attended man, even from the very earliest times:—"Abel was a keeper of sheep."

GENUS *Ovis*. (LINN.)

The Sheep have voluminous horns, turning outwards, and more or less spirally twisted. The outline of the face (*chaffron*) is convex; the ears are pointed, the nostrils long and oblique, the chin usually destitute of a beard. The limbs are feebler and more slender than in the Goats, and there is an open sac at the base of the toes on each foot. The males are not odorous.

We shall speak of the Sheep (*Ovis aries*, LINN.) as we have it in a domesticated condition, alone; for as we have already intimated, we consider the domestic animals as having never existed in any other than a servile state, even from their creation, though individuals may have emancipated themselves. The Sacred Scriptures make mention of the Sheep in the very earliest of its records. It was at the fall that "the LORD God made coats of *skins*, and clothed" our parents; and probably the original possessors of these skins were offered up in sacrificial atonement, as we know "the firstlings of the flock" were by Abel. And thus, no sooner had sin entered into the world than the poor sinner was, by means of this animal, typically directed to look for a covering of his soul's nakedness to the Righteousness of Another, as well as for atonement to the shedding of His Blood. Through the interesting history of the patriarchal worship, in the substitution of a ram for Isaac, in the deliverance of Israel by the blood of the paschal lamb, and especially in the varied offerings under the law, until His coming whom they shadowed forth, the Christian delights to

trace the varied figures and types of the blessed Lord, once manifested as “the Lamb of God which taketh away the sin of the world,” and now the Object of our worship, “in the midst of the throne, a Lamb, as it had been slain.”



SHEEP OF PALESTINE.\*

The wool (Gen. xxxi. 19), the flesh (ver. 38) and the milk (Deut. xxxii. 14) seem to have been very early appreciated as valuable products of the Sheep. With us, indeed, “the milk of

\* The beautiful animal represented in our engraving, commonly known as the Cretan Sheep, is spread over the coasts of the Levant.

the flock" has given place to that of the herd; but the former two products retain their importance. Soon after the subjugation of Britain by the Romans, a woollen manufactory was established at Winchester, situated in the midst of a district then, as now, peculiarly suited to the short-woolled breed of sheep. So successful



SHEEP-SHEARING.

was this manufacture, that British cloths soon were preferred at Rome to those of any other part of the empire, and were worn by the most opulent on festive and ceremonial occasions. From

that time forward the production of wool in this island, and the various textile manufactures connected with it, have gone on increasing, until the former amounts to above 100,000,000 of pounds annually, in addition to an import of half as much, principally from Saxony and Australia; while the latter are estimated to support 1,200,000 persons, producing goods to the annual value of 26,155,870*l.* sterling.\*

The numerous breeds of Sheep nurtured in this country are distinguished by the comparative length of the fibres which compose their fleece. They are spoken of as short-woolled, middle-woolled, or long-woolled sheep. To the former belong the Anglo-Merino, Saxony, and Australian breeds, whose wool, short, fine, and silky, is used in the manufacture of broad-cloths.

The principal middle-woolled breeds are the South-down, Dorset, Norfolk, Suffolk, and Cheviot, most of which were formerly short-woolled, but have been improved by culture. The fleece is used for the coarser cloths, flannels, and similar fabrics.

The Leicester breed, and other races which are now nearly lost by admixture with it, such as the old Lincolnshire, are long-woolled. The fibre is characterized by strength and transparency, but is deficient in the power of *felting*, on which the compactness of cloth depends: its length averages about eight inches. It is used for merinos, mouselines de laine, hosiery, &c. The breeds most esteemed for the flavour of their flesh are the Welsh, the South-down, and the Cheviot sheep.

\* Penny Cycl. vol. xxvii. pp. 548, 556.

## FAMILY V. BOVIDÆ.

(Oxen.)

Though the small group of Ruminants which are known as Oxen are so obviously marked as to be recognised without difficulty, even by an unscientific observer, their family characters are subordinate and comparatively unimportant. They have horns in both sexes, which are permanent, hollow, and supported upon bony cores, which have numerous cells communicating with the interior of the skull. The horns are simple, rounded, and tapering to a point; they are curved outwards and upwards, so as to form together a crescent, including the bony ridge of the forehead by which they are connected. There are no cavities beneath the eyes, nor at the base of the toes. The *mammæ* are situated between the hinder limbs, and have four teats. The forehead is expansive; the muzzle, with one exception, broad, naked, and moist; the neck, which is carried in the same line as the body, is thick, deep, and compressed; from its under part hangs a pendulous doubling of the skin, called a *dewlap*. The processes of the spine, at the shoulders, are high, hence the withers are always elevated, and in several instances surmounted by a hump. The general form is massive; the head is large, the body square and heavy, the haunches wide, the limbs low and strong. The expression of the countenance is often, particularly in the males, malignant and threatening, indicative of the ferocity that belongs to several of the species. On

the other hand, the Cow and Ox of the domestic species, are often remarkable for the quiet gentleness of their physiognomy.

The Oxen are social in their habits, and some are gregarious, associating in immense herds; as the Bison of the American prairies. Limited as is the Family, every part of the world has some indigenous species, with the exception of South America and Australia; and in these the domestic race introduced by Europeans has already spread in herds in an emancipated condition.

#### GENUS *Bos*. (LINN.)

The characters already given as distinguishing the Family *Bovidae*, may be considered as those of its only genus, *Bos*, for though the Musk-Ox of Arctic America does approach the Sheep more closely than the other Oxen, there do not appear to us sufficient differences to constitute it a separate genus. The principal distinctions of this species, which has been named *Ovibos moschatus*, are, that the horns are very broad at their base, hang down by the sides of the head, and turn up at the points; the muzzle is not naked; the tail and ears are very short; the hair is long and woolly.

On the other hand, the typical Oxen have the horns simply curved upwards, or slightly turned outwards at the tips, the muzzle naked, the tail and ears rather long, and the hair for the most part straight, short and close.

“Of all the animals,” observes Mr. Bell, “which have been reduced into the immediate service of man, the Ox is, without exception, that to which

he is most indebted for the variety and extent of its means of usefulness. If the qualities of the Dog are of a higher and more intellectual character, and bring it into closer communication with man as a social being; and if the Horse, as a beast of burden, and of draught, serve more to his immediate personal assistance, the Ox sur-



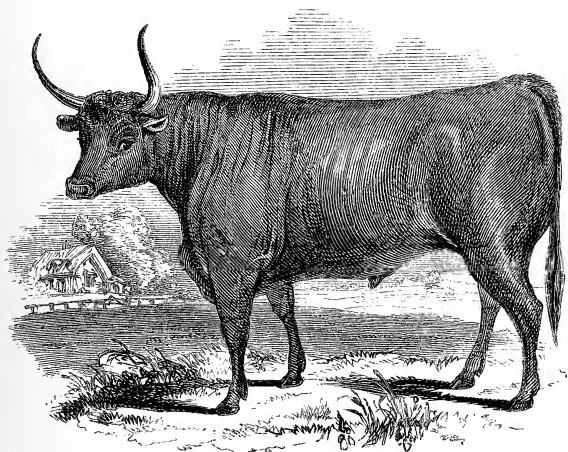
DURHAM OX.

passes these, and all others, in the devotion of its powers while living, and the appropriation of every part of the body when dead, to the wants, the comforts, and the luxuries of his owner." \*

The domestic cattle (*Bos taurus*, LINN.) which form so important a part of the rural wealth of

\* Brit. Quad. 412.

this country, may be considered as either short-horned or long-horned. Of the former the improved Durham breed is perhaps the most valuable for the dairy, as well as for a tendency to fatten rapidly, and at an early age. Of the latter, the new Leicester, as improved by Bakewell, was considered inferior to none in smallness



DEVON OX.

of bone, and aptitude to fatten. The flesh was fine-grained, and the fat well intermixed in the muscle. The cows, however, gave but little milk; and the breed has now lost much of its former reputation. The North Devon breed is intermediate in the length of the horns. In beauty and activity it is superior to any other, and is a per-

fect type of the working Ox. These cattle are the most valuable for the plough; they walk almost as fast as horses, and will work well in pairs: in returning with empty waggons in harness, they will trot at the rate of six miles an hour. The cows are good milkers, the richness of the cream compensating for deficiency of quantity. Though not equal to the Durham breed in capacity of fattening, yet they hold a fair rank in this respect, and their flesh is of excellent quality.

The Alderney and the hornless Suffolk cows are much prized for the dairy; the former for the peculiar richness of their milk, the latter for its quantity. In the height of the season a Suffolk cow will yield thirty-two quarts of milk daily.

In a few private parks in Scotland, and the north of England, there exists a breed of cattle, in a wild state, which is probably identical in species with the domestic race. They are invariably white, with red ears, and a black muzzle. "At the first appearance of any person," observes Mr. Culley, "they set off in full gallop, and, at the distance of about two hundred yards, make a wheel round, and come boldly up again, tossing their heads in a menacing manner: on a sudden they make a full stop, at the distance of forty or fifty yards, looking wildly at the object of their surprise; but upon the least motion being made they all again turn round, and fly off with equal speed, but not to the same distance; forming a shorter circle, and again returning with a bolder and more threatening aspect than before; they approach much nearer, probably within thirty yards, when they again make another stand, and then fly off: this they do several times, shortening

their distance, and advancing nearer and nearer, till they come within such a short distance that most people think it prudent to leave them, not choosing to provoke them further."

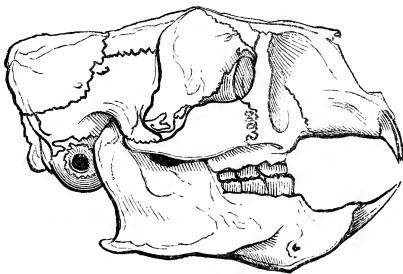
Formerly the hunting of a Bull from these wild herds was attended with much "pomp and circumstance;" but of late years it has been relinquished, from its danger; and now the keeper shoots them as needed, with the rifle.



## ORDER VIII. RODENTIA.

*(Gnawing Animals.)*

The Order before us, which is very extensive in genera and species, consists of animals, all of which may be characterized as of small, and, for the most part, of diminutive size. They may be readily known by the incisor teeth, which, two in number in each jaw, project from the very extremity of the jaw, in a forward curve: they are strong, compressed, and armed only on the



SKULL OF PORCUPINE.

front side with enamel; which being more durable than the bony matter of the rest, always maintains a sharp chisel-like edge to the teeth. They have no roots, but are deeply inserted in their sockets; and springing from a pulpy germ, are

continually growing. Thus provision is made to meet the loss by wearing down, which otherwise would very soon result from the use to which they are constantly applied: for the action of these teeth is not that of biting, as in the Apes, nor of tearing, as in the Cats, nor of cropping as in the Ruminants, but of *gnawing*, as the name *Rodentia* implies; a patient scraping, filing, or nibbling away the surface of the substances which they attack, often the bark or wood of trees, or the shells of nuts, of almost a stony hardness. The hinge-joint of the lower-jaw is of such a character as to allow of no other horizontal motion than forwards and backwards; and hence the flat crowns of the molar teeth have their enamel ridges set transversely; so that the motion of the jaw brings their surfaces into more effectual contact for the purpose of grinding. In general the teeth are of a frugivorous character; but some have the molars set with blunt tubercles, or sharp points, and these are less restricted in their diet; the latter manifesting, indeed, more or less appetite for animal food. The canine teeth are always wanting.

“The structural organization of the Rodents,” observes Mr. Martin, “as evidenced by the characters of the skull, the bird-like condition of the brain, and by other points, is at a low par, and the ratio of their intelligence is in a parallel degree. We may tame them, but we cannot educate them. They are all timid and feeble, and trust for self-protection to flight or concealment. The prey of ferocious beasts, and birds, and reptiles, their fertility, by a wise provision, counterbalances their annual diminution. Spread over the earth, from

the equator to the coldest latitudes, they tenant rocks and mountains, plains and woods, feeding on grain and vegetables, and often devastating the cultivated domains of man . . . . . Most are nocturnal, or crepuscular in their habits; many dwell in burrows; some conceal themselves amidst herbage, some amongst the foliage of trees, and some build for themselves habitations, which have excited the interest and admiration of man." \*

We may consider the *Rodentia* as constituted of five Families, *Sciuridæ*, *Muridæ*, *Castoridæ*, *Hystriidæ*, and *Leporidæ*.

## FAMILY I. SCIURIDÆ.

(*Squirrels.*)

The most elegant and sprightly of all the *Rodentia* are the numerous and widely-scattered species of the present group. They are known by having simple molar teeth with tuberculous crowns; the lower incisors much compressed. Their number and arrangement are as follows:—Inc.  $\frac{2}{2}$ ; can.  $\frac{0}{0}$ ; mol.  $\frac{5-5}{4-4}$ ; = 22. The toes are long, with sharp and hooked claws, four on each fore-foot, and five on the hind: there is, however, the rudiment of a thumb on the fore paw. The presence of well-developed collar-bones (*clavicles*), gives much power and versatility in the use of these paws as hands. In feeding, the Squirrels usually sit upon the haunches, and holding the food between the rudimentary thumbs of both paws, nibble at it till it is consumed. The ears

\* Pict. Mus. i. 54.

are often tipped with a pencil of hairs, but not invariably. The tail is long, as are also the hairs with which it is clothed; and these are more or less arranged so as to diverge on each side, somewhat like the beards of a feather. In two genera,—the Flying-Squirrels of India, and the adjacent islands (*Pteromys*), and those of North America and Siberia (*Sciuropterus*),—the skin of the sides is expanded between the fore and hind limbs, so as to confer the power of performing protracted leaps. Most of the species are arboreal in their habits, but one genus, the pretty Ground Squirrels (*Tamias*), burrow in the ground. The *Sciuridæ* are spread over the whole world, with the exception of Australia.

#### GENUS *SCIURUS*. (LINN.)

In the typical Squirrels the limbs are free, that is, not connected by an expansion of the skin; the molar teeth are tuberculous, the first one in the upper jaw very small; the upper incisors are chisel-shaped, the lower ones pointed and laterally compressed; and the tail is long and bushy, with the feathered arrangement very apparent.

Few persons are unacquainted with our common Squirrel (*Sciurus vulgaris*, LINN.), either in its wild state, or in captivity. There are, perhaps, none of our native quadrupeds that can compete with it in grace, sprightliness, and agility, in the beauty of its form and hue, or the arch and yet gentle expression of its countenance. The astonishing freedom and rapidity of its motions; the elegant curves into which it throws its long dilated

tail, frequently setting it up as a protection over its body;\* the ease with which it is tamed, and the elegant playfulness of its manners, have rendered it a favourite pet. It inhabits our forests



SQUIRREL.

and plantations, feeding upon acorns, nuts, beech-mast, the buds of pine-trees, and green bark. Large quantities of food are stored up by it in the hollows of trees for its winter supply, collected by its diligence during the autumn. Hence the Squirrel, like the Ant, is a fit emblem of industry and economy.

\* The name *Squirrel* is derived from this habit; it signifies "shadow-tail;" from *σκια*, a shadow, and *ουρα*, a tail.

“ The little Squirrel hath no other food  
Than that which Nature’s thrifty hand provides ;  
And in purveying up and down the wood,  
She many cold wet storms for that abides.  
She lies not heartless in her mossy dray,  
Nor feareth to adventure through the rain ;  
But skippeth out, and bears it as she may,  
Until the season waxeth calm again.”

WITHER’S *Emblems*.

The Squirrel’s nest, or *drey*, is not made in the same situation as its hoard, but among the branches. Mr. Jesse, in his charming “Gleanings,” says that it appears to give the preference to the fir. “In forming the nest they begin by gathering mouthfuls of dry benty grass, in the way we see rabbits do, and of this grass they make a considerable deposit. The outside is afterwards protected with a quantity of sticks, giving the nest the appearance of a bird’s-nest.”

The readiness with which the Squirrel extracts the kernel from a nut is well known, and Mr. Bell has recorded the interesting circumstance that it carefully removes every particle of the brown skin before it begins to eat the kernel. That accurate observer, White of Selbourne, notices the various modes which different animals employ to effect the same object, and adduces this as an instance. “The Squirrel, the Field-mouse, and the bird called a Nut-hatch, live much on nuts, which they open each in a very different manner. The first splits the shell in two with his long fore-teeth, as a man does with his knife ; the second drills a small round regular hole in the side of the nut ; while the last picks an irregular hole with its bill.”

The fur of the Squirrel, which is red in summer,

becomes in cold countries grey in winter, and even in England this change takes place, though in a slight degree. The long pencilled hairs with which the ears are furnished are lost during summer.

## FAMILY II. MURIDÆ.

(*Mice.*)

The very extensive group of small rodent animals which have received the name of Rats and Mice, have in each jaw, besides the two incisors common to the Order, three molars on each side, fixed by distinct roots, the crowns of which are surmounted by blunt tubercles, which when worn down assume the form of a disk variously indented. The teeth of the upper jaw shelve backwards, those of the lower forwards. The tail is long, round, and tapering to a point; furnished with short hairs or scattered bristles, growing at intervals from beneath scaly rings formed by the outer layer of the skin (*epidermis*). There are always five toes on the hind feet, and usually four on the anterior, with the slight rudiment of a thumb: the feet are neither webbed nor fringed with stiff hair; though several species swim with facility. The fur is often intermixed with longer bristles, or flat spines.

The ordinary food of the animals before us consists of grain, seeds, and farinaceous vegetable substances; and for the bruising of these the structure of their teeth is adapted. Yet we might infer from it that animal food would not be rejected by them: and experience abundantly proves this to be the case. The depredations of our most

common species upon the contents of our larders and pantries are but too extensively known; and the carnivorous voracity of the Brown Rat is shown in a very striking and even revolting manner in the horse slaughter-houses at Paris, where the carcasses of the horses killed in the course of a day, sometimes amounting to thirty-five, are during the night picked to the bare bones by these creatures. They also attack with ferocity and devour any small animals they can master; and have sanguine encounters among themselves.

The fertility of the Mice is very great; so that, notwithstanding the incessant warfare waged on them by man in various ways, they baffle all his efforts to extirpate them. They have been carried, in their intrusive and unwelcome state of semi-domestication, wherever civilized man has established his domain; so that it is now difficult to ascertain the original residence of these our most common vermin. Other species, however, are very numerous, and are found over the whole globe: especially in South America.

#### GENUS *Mus*. (LINN.)

In this, the typical genus of the Family above described, we find the incisors of the usual number, the upper ones wedge-shaped, the lower compressed and pointed; three molars on each side, both above and below; the fore one the largest, the hind one the smallest. The muzzle is pointed, and more or less lengthened; the ears oblong or rounded, frequently very large, and almost naked. The limbs are short, and of the

usual relative proportions; the tail scaly, long, and gradually tapering.

We illustrate the genus by the pretty little Harvest Mouse (*Mus messorius*, SHAW.), the smallest, as we believe, of all quadrupeds; certainly of such as inhabit this country. The length of its head and body does not exceed two inches and a half, and that of the tail is not quite so much.



HARVEST MOUSE.

Its colour is a bright reddish brown above; the under parts are pure white. White, of Selbourne, first made it known as a British species, and describes its beautiful globular nest, as "most artificially platted, and composed of the blades of wheat; perfectly round, and about the size of a cricket-ball, with the aperture so ingeniously closed that there was no discovering to what part it belonged. It was so compact and well-filled

that it would roll across the table without being discomposed, though it contained eight little Mice that were naked and blind . . . This wonderful procreant cradle, an elegant instance of the efforts of instinct, was found in a wheat-field suspended in the head of a thistle."



NEST OF HARVEST MOUSE.

The principal food of the Harvest Mouse is corn; but it is fond of insects also, as was accidentally discovered by Bingley, in one which he had in captivity. "One evening," he observes, "as I was sitting at my writing-desk, and the

animal was playing about in the open part of its cage, a large blue fly happened to buzz against the wires. The little creature, although at twice or thrice the distance of her own length from it, sprang along the wires with the greatest agility, and would certainly have seized it, had the space between the wires been sufficiently wide to have admitted her teeth or paws to reach it. I was surprised at this occurrence, as I had been led to believe that the Harvest Mouse was merely a granivorous animal. I caught the fly, and made it buzz in my fingers against the wires. The Mouse, though usually shy and timid, immediately came out of her hiding-place, and running to the spot, seized and devoured it. From this time, I fed her with insects, whenever I could get them; and she always preferred them to every other kind of food that I offered her."

### FAMILY III. CASTORIDÆ.

(*Beavers.*)

The animals of this family have a mouse-like form, and in many respects resemble the *Muridæ* in manners. Like them, too, they have perfect clavicles; but they differ in the structure of their molar teeth, which are compound: their crowns presenting a flattened surface, on which the lines of enamel are so disposed as to form three folds on the outer side, and one on the inner, in those of the upper jaw; while those of the lower have this arrangement reversed. The incisors are very strong, and chisel-shaped. The muzzle is short and rounded; the ears short, the hind feet robust;

the toes to a greater or less degree connected by membrane : all the feet are five-toed.

The Beavers are constructed for a semi-aquatic life ; and though some of the aberrant species, as our own little Field Vole (*Arvicola agrestis*), do not, as far as we know, voluntarily take to the water, yet their fondness for damp situations, and their inability to resist a dry season, shew the family habit, though in a slight degree. They are confined to the Northern Hemisphere.

#### GENUS *CASTOR*. (LINN.)

The single species of which this genus is composed has always possessed much interest, not only as yielding a medicinal drug, and a fur very extensively used in the formation of an indispensable article of dress, but principally as displaying an architectural instinct, very rare among *Mammalia*, though so common among Birds and Insects, many of which exercise it in a far superior degree. The Beaver is distinguished from the other genera of the Family, by having four molar teeth on each side, both above and below : by the hinder feet being strongly webbed, the membrane reaching beyond the bases of the claws : by having the second toe of each hind foot furnished with a double nail, an upper one corresponding to the others, and a lower one placed obliquely, with a sharp edge directed downwards : and above all by the peculiar structure of the tail. This organ is nearly half as long as the body, broad and oval, flattened above and below, but somewhat thick, composed of a gristly fat, and covered with an incrustated skin, which is

divided into regular scales, resembling those of fishes.

The Beaver (*Castor fiber*, LINN.) is found both in Europe and North America: and, as late as the twelfth century, was an inhabitant of Great Britain. On the continent of Europe it has become scarce, but in the northern parts of America it is still numerous, though immense numbers are killed annually for their skins. Formerly from 100,000 to 200,000 beaver skins were im-



THE BEAVER.

ported yearly into Europe, but the present amount is much diminished.

The most interesting point in the history of this animal, as has been already mentioned, is its

instinctive association for the purpose of building structures of considerable size and durability. These are habitations for winter-residence, and dams for maintaining an equable depth of water. The latter are not needed when the beaver-house is erected in a pond or lake, or broad river; but these situations are less frequently chosen than a narrow stream, as in the latter case the current enables the animals to float down materials, besides affording them additional security. If there is a probability of the water diminishing by reason of the freezing of the source, they display wonderful sagacity in forming a dam quite across the river at some distance from their house. If the current be sluggish, the dam is nearly straight, but if it be rapid, additional strength is imparted to the structure by making it convex towards the stream. The materials used are drift-wood, or young trees cut down by the sharp cutting teeth of the Beavers, and gnawed into lengths, with mud and stones dragged from the banks and bottom, the whole intermixed without any regularity, except that which preserves the general sweep of the dam. The sticks are not forced into the bottom as has been pretended, but are laid horizontally, and are kept in their places simply by the weight of the stones and mud laid over them. "In places," says Hearne, "which have been long frequented by Beavers undisturbed, their dams, by frequent repairing, become a solid bank, capable of resisting a great force both of water and ice; and as the willow, poplar, and birch, generally take root and shoot up, they by degrees form a kind of regular planted hedge, which I have seen in some places

so tall that birds have built their nests among the branches."

The huts are built in the same general manner, projecting from the bank, or from an islet in the stream; a spot being always selected where the water is at least three or four feet deep, to prevent the effects of severe frost. They are of a round form, with the summit, which rises to the height of several feet above the surface, domed over. The sides are enormously thick; Hearne speaks of one which was "more than eight feet thick in the crown." A single entrance is made, which is covered with a projecting porch; and this is invariably at some considerable distance beneath the surface. "It is a great piece of policy," remarks the accurate observer already quoted, "in these animals, to cover the outside of their houses every fall with fresh mud, and as late as possible in the autumn, even when the frost becomes pretty severe, as by this means it soon freezes as hard as a stone, and prevents their common enemy, the Wolverine, from disturbing them during the winter; and as they are frequently seen to walk over their work, and sometimes to give a flap with their tail, particularly when plunging into the water, this has, without doubt, given rise to the vulgar opinion that they used their tails as a trowel, with which they plaster their houses; whereas that flapping of the tail is no more than a custom which they always preserve, even when they become tame and domestic, and more particularly so when they are startled."

The food of the Beaver consists in summer of the bark of the willow, birch, and poplar; but as in the winter the ice confines them to their habi-

tations, or the bottom of the water, they are able to indulge in this food only so far as they have in the summer cut down green trees, and thrown them into the water in front of their door. At this season their chief support is the fleshy root of a large species of water-lily. This root imparts a rank taste to their flesh, which is at other times in high estimation.

The Beavers which are found in the European rivers are for the most part solitary, and dwell in burrows in the banks. They have hence been supposed to be destitute of the building instinct, and therefore specifically distinct from those of America. But the recent discovery of a colony of building Beavers on a little tributary of the Elbe has dispelled this notion, for these were found to inhabit houses of eight or ten feet in height, and to have constructed a dam which raised the water more than a foot; while their work was in no way inferior to that of their western brethren.

An anecdote related by M. Geoff. St. Hilaire of a Beaver from the Rhone, which was kept in the Paris menagerie, also illustrates this instinct in an European individual. "Fresh branches were regularly put into his cage, together with his food, consisting of legumes, fruit, &c., to amuse him during the night, and minister to his gnawing propensity. He had only litter to shield him from the frost, and the door of his cage closed badly. One bitter winter night it snowed, and the snow had collected in one corner. These were all his materials, and the poor Beaver disposed of them to secure himself from the nipping air. The branches he interwove between the bars

of his cage, precisely as a basket-maker would have done. In the intervals he placed his litter, his carrots, his apples, his all, fashioning each with his teeth, so as to fit them to the spaces to be filled. To stop the interstices, he covered the whole with snow, which froze in the night, and in the morning it was found that he had thus built a wall which occupied two-thirds of the doorway." \*

#### FAMILY IV. HYSTRICIDÆ.

(*Porcupines.*)

Among the *Insectivora* we found a Family of animals clad in a coat of spiny armour. We are now to consider another group similarly furnished, but in which this defensive array of spines is much more strongly developed than in the Hedgehogs. The Porcupines are covered with a close series of hollow tubes, somewhat like the quills of feathers, usually terminating in a fine point of enamel, of great hardness, but in some instances open at the extremity, as if they had been cut off in their greatest thickness. "The spiny quills of the Porcupine," observes Mr. Martin, "consist of a smooth glossy envelope of horn, and an inner pith, or medullary substance, of a soft texture, and of a pure white. They grow from a bulbous root, formed within a cell below the *cutis* [or true skin], and containing also a portion of fat, in which the vessels supplying its pulp and capsule are imbedded. The capsules consist of two membranes, of which the innermost secretes

\* Mém. du Mus. d'Hist. Naturelle, xii.

the horny envelope, while the pulp supplies the pith of the spine."\*

The molar teeth are four on each side above and below, furnished with roots, nearly equal in size, nearly round in outline, covered at first with several tubercles, which when worn down present as many oblong layers of enamel on the crown of the tooth, while both the exterior and interior sides are marked by deep folds of the outer coat. The head is short and the muzzle abrupt; the eyes and ears are small, but the nostrils are large and open: the tongue is roughened with scaly prickles directed backwards: the clavicles (or collar-bones) are rudimentary, and hence the forelimbs have not the freedom of motion common to the families we have been considering: their motions are slow and ungraceful, and their form short, thick, and clumsy.

The species of *Hystriidæ*, though not numerous, are extensively distributed; each great division of the globe has one or more representatives of the family, with the exception of Australia. Most of them are nocturnal animals of sluggish habits, living in burrows which they excavate for themselves. Some species, found in America, climb trees, as the genera *Erethizon* and *Synætheres*, the latter of which has the tip of the tail prehensile.

\* Quadrupeds, p. 154



QUILL OF PORCUPINE.

GENUS *HYSTRIX*. (LINN.)

The Porcupines of the old continent are distinguished by a very convex line of profile, the bones of the nose being much developed. The molar teeth are more elevated above the level of the jaw, and less irregular in their outline, and in the lines of enamel upon their crowns, than those of other genera of this Family. The feet are armed with large nails; the front ones have but four toes each, the presence of a fifth being indicated only by a nail: on the hind feet are five toes. The tail is short, with no prehensile power, clothed with quills open at the end, and, as it were, cut off.

The Common Porcupine (*Hystrix cristata*, LINN.) is found in Italy, and the North of Africa; but its introduction from the latter country to the former is mentioned by Agricola as having occurred in his time. It is one of the largest of the *Rodentia*, measuring nearly two feet in length, and some of its longest spines exceed a foot. It is of a dusky black hue, with a whitish band on the neck. On the head is a crest of long pale hair, capable of being erected at pleasure. The back, sides, and hinder parts, are armed with spines, which are very hard and sharp, about as thick as a goose-quill in the middle, furrowed through their length, and marked with broad alternate rings of black and white. They usually lie horizontally, but when the animal is excited (and he is very irritable) a set of muscles beneath the skin erects the spines, which then project stiffly, and present a formidable array which can-

not be approached without danger. The animal is said when assaulted to turn his back towards



AFRICAN PORCUPINE.

his enemy, and push against him; and wounds thus inflicted are very severe. The common notion, that it has the power of shooting its spines at an adversary, as a means of defence, though of considerable antiquity, is entirely without foundation.

The strong claws of this animal are of service in the excavation of its burrow, in which it sleeps during the day, coming forth in the evening to feed on roots, fruits, and tender shoots of shrubs. In captivity it is dull, manifesting scarcely a shadow of intelligence.

## FAMILY V. LEPORIDÆ.

(Hares, &amp;c.)

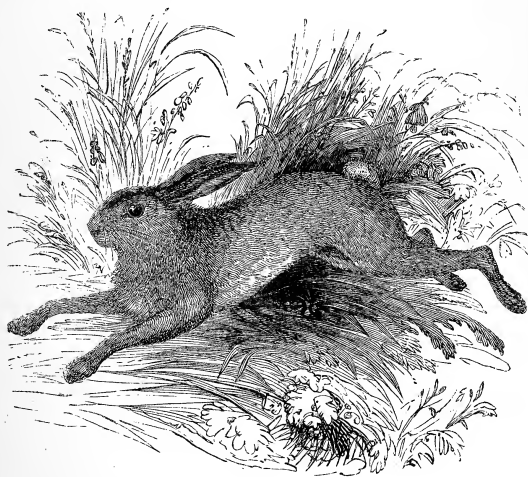
A remarkable exception to the ordinary character of the *Rodentia*, distinguishes the typical genera of the present family. Behind the two incisive teeth, common to the group, there are in the Hares in the upper jaw two additional ones of smaller size. The molars are numerous, destitute of true roots. The interior of the cheeks, and the soles of the feet, are clothed with hair as the external parts. The fur is copious, soft; the eyes are large, and prominent; the tail very short or wanting; the hind limbs usually more developed than the fore ones; the clavicles are wanting.

The *Leporidæ* are timid, vigilant, and swift-footed. Their geographical distribution is extensive; but North America alone contains nearly as many species as are known to inhabit all the rest of the world.

GENUS *LEPUS*. (LINN.)

Lengthened and very moveable ears, a short erected tail, and hinder limbs muscular and much longer than the fore, are the generic distinctions of the Hares and Rabbits. Upwards of thirty species are known, of which half belongs to the North American continent. Four species inhabit the British Islands; the Common Hare (*Lepus timidus*, LINN.), the Alpine Hare (*L. variabilis*, PALL.); the Irish Hare (*L. Hibernicus*, BELL), a species but recently identified, and the Rabbit. (*L. cuniculus*, LINN.)

The Hare is an animal of extreme vigilance ; its senses are very acute, its fleetness, in proportion to its size, perhaps unrivalled. Were it otherwise it must be soon exterminated, for it has no power of defence, and no means of concealment,



THE HARE.

except that of lying close among the russet herbage ; while it has many enemies. Birds of prey pounce upon it ; dogs pursue it eagerly ; foxes, stoats, polecats, and weasels, prey upon it ; but its worst foe is man, who even from remote times has counted the chase of the Hare among the most exciting of rural amusements. “ But, after all,” observes Mr. Bell on this subject,

‘ Poor is the triumph o’er the timid Hare ;’

and whatever excuses may be found for the pursuit of the Fox on the score of necessity, as ridding the country of a noxious animal,—an excuse, however, which can scarcely be made by those who forbid its destruction by any other means, as an unpardonable offence against the sportman's arbitrary code,—no such excuse can be made for this sport; whilst, on the other hand, the degree of danger and difficulty is scarcely sufficient to invest it with enough of excitement to conceal its character of cowardice and cruelty. It is true that coursing is in a degree less cruel, as the poor trembler's agony is comparatively short-lived; but it appears to me that mercy and humanity can scarcely consist with the ardent love of either variety of a sport, the whole interest of which depends upon the intense exertion to which a helpless and defenceless creature can be driven by the agonies of fear and desperation.”\*

Mr. Jesse adduces instances which shew that the sense of smell is acute and delicate in the Hare: poachers acquainted with this fact set their nets at some particular gap in a field, and then, going round the field, whiff tobacco-smoke over all the other gaps and runs. The Hares will not pass where the smoke has been blown, but selects the untainted egress, and so is caught.† The male or Jack-hare will seek his mate and trace her by the scent. Mr. Jesse has seen one when at fault make a cast, and hunt his ground as a dog would do, till he had again hit off the right way, and follow with the greatest eagerness.‡ The male will readily take to the water in search of his companion.

\* Brit. Quad. 335.

† Gleanings, 343.

‡ Ibid., 365.

Cowper's three pet Hares are perpetuated by his own muse, which threw a charm over everything it touched. He represents them as amiable and interesting. One would not expect animals so proverbially timid and defenceless to fight with a courage so indomitable as to yield only with life. Yet Mr. Waterton has described in his own graphic manner, a battle of two Hares, which took place before his own eyes; which was continued till one died upon the field, the conqueror continuing to strike his prostrate adversary, when incapable of further resistance, with a pertinacious malice and fury.\*

\* Zoologist, i. 211.



## ORDER IX. EDENTATA.

(*Toothless Animals.*)

THE name by which this Order of *Mammalia* is distinguished must not be too literally understood. It was applied by Baron Cuvier, with strict reference to the incisor teeth, which are never present in these animals. Of several of the genera, however, (those constituting the Family *Myrmecophagadæ*) the term is descriptive in the fullest sense, they being totally deprived of teeth; and in those which possess these organs they are peculiar in their construction, being formed without a neck, and destitute of enamel.

Another character of these animals is derived from their nails or claws, which are of great size and strength, more or less hooked, generally sheathed, and directed downwards. For the most part the claws constitute a powerful digging apparatus, used either for the purpose of burrowing in the ground, or tearing away the earthen structures of various insects; or else they are so deflected as to form hooks by means of which the animal clings to the branches of a tree while devouring its fruit or leaves.

As animals of much diversity of form and habits are associated together in the present Order, the group was at one time supposed to be more convenient than natural; but recent discoveries in rapid succession of enormous fossil animals

in South America have greatly increased our acquaintance with this Order, and supplied links of connection by the means of which the existing genera are bound together in a strong and well-defined relationship. Of all these animals none appeared to deviate more in structure and habits from all other quadrupeds than the slow-moving and climbing Sloths. But with the advantage of our present knowledge of the extinct *Megatherioids*, those anomalous creatures, which were formerly believed to be a very restricted and aberrant group, are now recognised as the small remnant of an extensive tribe of leaf-eating and tree-destroying animals, the larger extinct species of which, with their gigantically-developed but modified *unguiculate* (or clawed) structure, formed the lowest grade of *Mammalia* furnished with claws.

The Order before us is no less restricted in geographical distribution than peculiar in structure. With one or two trifling exceptions, it is confined to South America, which continent was also the great home of the extinct species.

We may consider the *Edentata* as containing four Families, *Bradypodidæ*, *Megatheriadæ*, *Dasypodidæ*, and *Myrmecophagadæ*; of these the second in the enumeration exists only in a fossil state.

## FAMILY I. BRADYPODIDÆ.

(*Sloths.*)

Until recently, naturalists laboured under much ignorance of the natural habits of these strangely formed animals: and hence rash and unfounded

statements were made, reflecting even on the wisdom of the Creator. The name by which they are still distinguished is calculated to perpetuate these erroneous opinions, and hence we should feel unwilling to use it, were there any other title by which we might intelligibly designate the genus.

The sphere of action of these animals is amongst the branches and foliage of the dense forests that border the mighty rivers of South America. Their mode of progression is quite peculiar; as they cling to the horizontal or inclined branches with the back downward, and move onward in a style which may be compared to a feat that sailor-boys are fond of performing, going up the mainstay "hand over hand;" only that the Sloth uses all his limbs in the operation. Their food consists of the leaves of trees, with their buds and young shoots. To this singular mode of life the structure of the Sloths is adapted, with the same consummate wisdom and skill, that is manifest in all the other works of God.

The dentition of these animals is thus expressed—Inc.  $\frac{0}{0}$ ; can.  $\frac{1-1}{1-1}$ ; mol.  $\frac{4-4}{3-3}$ ;=18. The molars are very simple, each consisting merely of a cylinder of bone, enveloped in enamel: their surfaces are hence always concave, the soft interior wearing faster than the enamel edge; and there are no folds or *laminæ* of this latter substance penetrating the body of the tooth, as in most other animals. The canines are of similar formation, but are pointed. The fore limbs are generally lengthened; to such a degree that in attempting to move on a plane surface the animal is compelled to rest on its elbows. The *pelvis* is very large, and hence

the thigh bones are set so wide apart that the knees cannot be made to approach each other. The palms or soles of the feet are set on obliquely, facing inward, as we saw in the Apes, and for the same purpose. The bones of the feet are exceedingly rigid, being, to a considerable extent, soldered, as it were, together; and the toes are terminated by powerful hooked claws of enormous length, which in a condition of rest are drawn down upon the palm and wrist, and can be extended only by the will and muscular effort of the animal. It is easy to see how these characters are suited to a hanging and climbing habit: the sharp bent claws forming effective hooks for holding on, the immovable limbs for maintaining a firm hold, the oblique articulation of the feet and thighs for embracing a branch, and the great length of the arms for seizing a fresh hold, or for drawing the twigs and leaves to the mouth. In other respects, also, the same Divine care is manifest. Though the structure of the molar teeth will not admit of the food being much ground in the mouth, and the intestinal canal is unusually short for vegetable feeders,—yet this is compensated by the volume and complexity of the stomach, which is divided into four compartments, scarcely less elaborate than those of the *Ruminantia*. The body is clothed with long, coarse hair, somewhat resembling dried grass, or the tree-moss (*Tillandsia*) which hangs in immense bunches from the tropical forests. The face is short and round, like that of a Monkey. There are but three toes on the hind-feet, and either two or three, (according to the genus,) on the fore ones: the toes are enveloped in the skin.

The two genera which comprise this Family,

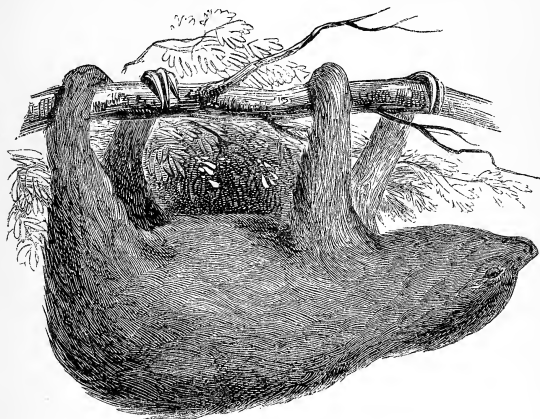
containing not more than three or four known species, are limited to the tropical regions of South America.

### GENUS *BRADYPUS*. (LINN.)

The characters already enumerated as belonging to the Family are more strongly marked in this genus than in the Unau (*Cholæpus*). It is also distinguished by having three claws on the fore-foot or hand: the thumb and little toe barely visible as rudimentary bones in the skeleton, being quite concealed by the skin. It possesses a tail, which, however, is short. The neck is lengthened, and endowed with a more complete power of rotation by the addition to it (in effect) of two bones; which, however, by their possession of rudimentary ribs, are proved to belong to the back; leaving the number of *true* neck-bones *seven*, as in all other *Mammalia*.

The Common Aï (*Bradypus tridactylus*, LINN., has a short round head, clothed with long rough hair, which diverges from the crown, like the human hair. The body is covered with long hair, coarse and flattened at the extremity, but as fine at the root as a spider's thread. Its colours are light and dark brown, dispersed in irregular patches, and varying much in individuals; an oval patch of finer shorter hair, of an orange-colour, is situated between the shoulders; the face, throat, and breast are of a pale straw-yellow. It is about as large as a Cat. The expression of its countenance is very melancholy, as is the sound of its voice, which resembles the syllables *ai*, feebly uttered in a plaintive tone.

We have already described the ordinary habits of the Aï in a state of freedom, as witnessed by Mr. Waterton, and other travellers. Specimens



THE AÏ.

have also been repeatedly brought to Europe, and observed in captivity. Mr. Burchell remarked of some in his possession that they assumed during sleep a position of perfect ease and safety on the fork of a tree, their arms embracing the trunk, their backs resting on the angle of a branch, and their heads reclining on their own bosoms. The animal is thus rolled up nearly in the form of a ball; the entire vertebral column, including the neck, assumes a nearly circular curve, and not only is the weight of the whole body maintained in an attitude of ease and safety, but the head is supported between the arms and chest, and the

face lies buried in the long wool which covers those parts, and is thus protected during sleep from the myriads of insects which would otherwise attack it.\*

## FAMILY II. MEGATHERIADÆ.

(*Fossil Sloths.*)

This group of animals, whose gigantic size and massive proportions strike us with astonishment as we contemplate their recovered fossil remains, have long ceased to make this earth resound with their heavy tread. Professor Owen, who names the Family *Gravigrada*, thus announces its distinctive characters: Feet short, very strong, equal or nearly equal; fore feet having either four or five toes; one or two of the external toes unarmed, fit for support and progression; the rest armed with great curved claws: tail moderately long, stout, and so formed as to act as a prop. In the structure of their teeth, and their general anatomy they resemble the Sloths. There are five or six genera, all discovered in America, and principally in the southern division of that continent.

### GENUS *MYLodon*. (OWEN.)

We must refer our readers to Professor Owen's most elaborate and interesting "Description of the Skeleton of an extinct Gigantic Sloth;" for a full account of this genus, as well as of others belonging to the same Family; or to the skeleton itself, as it stands in the noble museum of the Royal

\* Prof. Buckland, in Linn. Trans. 1835.

College of Surgeons, a monument of the talent and skill of that eminent zoologist, who built it up, bone by bone.



SKELETON OF MYLODON

We can merely give the results of the Professor's careful investigations. The *Mylodon robustus* was a Sloth having the size and proportions of a Rhinoceros, but with the limbs still more massive. The hind limbs, with the pelvis, and the tail are eminently colossal: and these were furnished with muscles, of immense power, and supplied with an extraordinary amount of nervous energy (indicated by the dimensions of the spinal tube).

Professor Owen concludes that the *Mylodon*, having partly exposed the roots of a living tree by means of its powerful front claws, adapted for digging, was accustomed to rear itself up on the broad tripod formed by its two immense hind feet and its strong tail, and embracing the trunk of the tree with its fore feet, put forth all its mighty strength in striving to overthrow it. "The tree being thus partly undermined and firmly grappled with, the muscles of the body, the pelvis, and the hind limbs, animated by the nervous influence of the unusually large spinal cord, would combine their forces with those of the anterior members in the efforts at prostration. And now let us picture to ourselves the massive frame of the *Megatherium*, convulsed with the mighty wrestling, every vibrating fibre reacting upon its bony attachment with a force which the strong and sharp crests and *apophyses* loudly bespeak,—extraordinary must have been the strength and proportions of that tree, which, rocked to and fro, to right and left, in such an embrace, could long withstand the efforts of its ponderous assailant."

The *Mylodon*, like the *Aï*, just described, was a leaf-eater, as the similar structure of its teeth witnesses; its weight and its bulk would preclude it from climbing; but by thus overturning the trees (which in dense forests, we may observe, have but a superficial hold of the ground) it was enabled to feast on the abundant foliage at its ease.

In its daily performance of such feats as these, the *Mylodon* must have been occasionally subject to heavy blows from the falling trunks, or the snapping branches. To guard against injuries

which might otherwise prove fatal, the brain was protected from concussion by the outer table of the skull being separated from the inner by extensive air-cells; so that the external surface of the skull might be crushed in without permanent injury. In the specimen examined by Professor Owen there are evidences of such accidents. The skull presents two extensive and complicated fractures, the one of which is partly, and the other entirely healed, and both of which are confined to the exterior table.

### FAMILY III. DASYPODIDÆ.

(*Armadillos.*)

“When we speak of a quadruped,” observes Buffon, “the very name carries with it the idea of an animal covered with hair, as that of a bird, or a fish, suggests the corresponding ideas of feathers or scales respectively, as attributes inseparable from these beings; yet nature, always more fertile in her resources than we are skilful in tracing her relations, or appreciating her designs, escapes at every moment from our most extensive observations, and astonishes us by her exceptions, still more than by her general laws.” We are presented with one of these exceptions in the animals before us, whose bodies are covered with a peculiar crust or shell, not unlike that of a lobster, forming three bucklers, on the head, shoulders, and rump respectively, the two latter being connected by a series of narrow cross-bands of similar material, so like the plate-armour of the middle ages, as to have suggested the Spanish

name Armadillo. The shields, as well as the bands, are composed of numerous, many-sided plates, placed side by side like paving-stones, but without any motion among themselves, except a limited degree of pliancy during life from the thinness of the whole. The transverse bands, however, connected by the skin, allow of free motion. The under parts, as well as the limbs, are covered with a thick grained skin, roughened by hard warts or tubercles, from which arise a few bristly hairs. The joints of the back-plates are also provided with long hairs, and a considerable fringe of the same grows from beneath the lateral edges of the bucklers. The tail is either grained like the under parts, or, more generally, encased in rings, resembling the back-plates.

The Armadillos are furnished with molar teeth alone, which vary in number in the different genera, never being less than twenty-six, in the whole, and in one species even amounting to ninety-eight. They are detached, those of one jaw fitting into the interstices of the other, as in the Dolphins. They are constructed on the same model as those of the preceding Families.

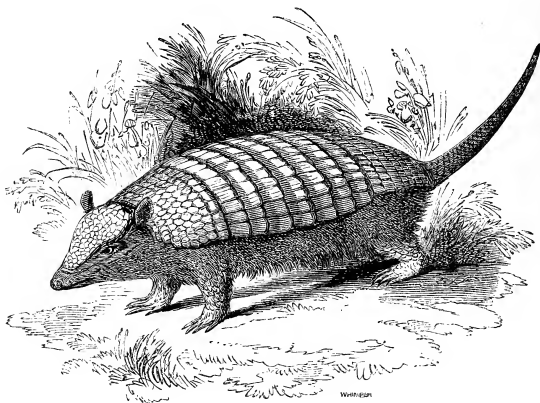
The animals of the present Family are confined to South America, where they feed on farinaceous roots, on carrion, and on ants, the dwellings of which they tear away with their powerful claws. They burrow with amazing rapidity, so as to disappear in the earth before they can be seized when suddenly surprised. They have, more or less perfectly, the power of rolling themselves up into a ball.

GENUS *DASYPUS*. (LINN.)

The Encouberts, as they are called by Cuvier, are distinguished from other Armadillos by having five toes on the fore feet, of which the exterior and interior are the smallest; by having nine or ten teeth on each side of each jaw; and especially by having two teeth in the inter-maxillary bones of the upper jaw, representing, as it were, the incisors of ordinary *Mammalia*, and thus forming a remarkable exception, not only to the other animals of this Family, but also to those of the whole Order *Edentata*. The tail is of moderate length, for the most part covered with scales, arranged in *quincunx*, that is, in the form of the *five* upon dice. The limbs are very short; the body is broad and unusually flat; yet these Armadillos are so swift of foot that few men can outstrip them. They also burrow with incredible rapidity.

The Weasel-headed Armadillo (*Dasypus encoubert*, DESM.) has been repeatedly brought to Europe, and several specimens have lived in the gardens of the Zoological Society of London. The head and body are about sixteen inches in length, and the tail is about six inches more. The head is large, flat, and nearly triangular, with the muzzle rounded; the eyes are small, the ears are erect, and of moderate size. This species has been commonly known as the six-banded Armadillo, but the number of the bands is now found to be an uncertain character: seven or eight are the ordinary number of this species. It is restless, unquiet, and curious: if any noise is made at the entrance of its burrow,

it grunts like a pig, and comes boldly forth to ascertain the cause of the disturbance, though it can make no effort at defence. Its only resource is in retreating, and burrowing to a greater depth. It feeds upon soft ground-fruits and roots, and also on carrion, whenever it can find it; and a



WEASEL-HEADED ARMADILLO.

large portion of the sustenance of this, as well as of other species, is derived from the numberless wild cattle which are caught and slaughtered on the Pampas for the sake of the hides and tallow, the carcasses of which are left, as valueless, to decay, or to become the prey of wild animals. Notwithstanding the filthy nature of their food, the Armadillos, being very fat, are eagerly sought for food by the inhabitants of European descent, as well as by the Indians. The animal is roasted in its shell, and is esteemed one of the greatest delicacies of

the country. The flesh is said to resemble that of a sucking-pig.

Azara has strikingly illustrated the unerring precision with which the Armadillo is able to push his mining operations in a given direction. "My friend Noséda," says he, "having arranged a trap for the purpose of taking chibigouzous (?), and having placed in it, by way of bait, a cock, with a small quantity of maize to support him, it so happened that a few grains of maize fell through between the boards which formed the bottom of the trap. An Armadillo arrived during the night, and wishing to get at the maize thus accidentally spilt, opened a trench or burrow at some distance from the trap, and without deviating a hair's breadth from the straight line of his direction, pushed it on to the very spot where the grain had fallen, and possessed himself of the booty."

An animal of burrowing habits, the Aardvark of South Africa (*Orycteropus capensis*, GEOFF.), though by its anatomy it seems to be related to the present Family more nearly than to the following, forms evidently a link of connexion between the two. It is clothed with scanty hair, feeds on ants, has a long slender muzzle, and a tongue in some degree extensile: but on the other hand the jaws are furnished with molar teeth. These are, it is true, of most singular structure, being simple cylinders without roots, and therefore always growing, covered with a coat of enamel on the crown, which when worn down reveals the interior of the tooth pierced with numerous small canals, running through its length, so that the teeth of this animal have been compared to pieces of cane cut across. The general figure of the Aard-vark

has a slight likeness to a small pig, and hence the name applied to it by the Dutch colonists, which signifies *earth-pig*.

#### FAMILY IV. MYRMECOPHAGADÆ.

(*Ant-eaters.*)

The teeth, which we have seen in the preceding Families gradually deviating more and more from the forms in which they occur in the higher *Mammalia*, are now no longer found; the mouth being entirely destitute of incisors, canines, and molars. The jaws are produced into a very long and slender muzzle, terminating in a mouth of extreme smallness. The tongue, which ordinarily lies folded upon itself within the mouth, is capable of protrusion to a great degree, even equaling in some species the length of the whole head and muzzle together. The whole food of these singular animals consists of the termites and ants of tropical countries, which dwell in immense numbers in edifices of their own construction. To tear down the walls of these insect-houses, considerable force is required, and hence the feet are armed with long, powerful, and trenchant claws, that on the middle toe of the fore-foot, in particular, being of enormous size and power. The claws are commonly bent down upon the palm as in the Sloths, being capable of only a partial extension, and that by muscular effort. With these formidable pick-axe-like talons, the Ant-eater tears away the exterior walls of the earthen nests of the termites, which immediately, according to their known instinct, crowding in thousands to the

point of attack, the quadruped darts among them his long slender tongue, covered with a viscid secretion, and draws it back into his mouth with a swift motion, covered with the entangled insects.

The affinity between these animals and the Sloths is strongly perceived in many points of their anatomy, besides the size and peculiar conformation of the claws; and particularly the great fossil Sloths, the *Megatheriidae*. Two very distinct forms are found in this Family: the one that of the Ant-eaters proper, confined to South America, covered with long coarse hair; the other that of the Pangolins of India and Africa, clothed with large sharp-edged, bony scales, overlapping one another like those of a fish. These also have the power of rolling themselves up into a ball, when the cutting edges of the scales project on all sides and form an efficient defence. With this very obvious exception, however, there is little difference in anatomy or economy, between the Ant-eaters and the Pangolins.

#### GENUS *MYRMECOPHAGA*. (LINN.)

We have but little to add to the distinguishing characters of this small group, which we have indicated above. The toes, of which we have already spoken, vary in number in the species; for while the Great Ant-bear and the Tamandua have four on the front feet, and five on the hind, the Little Ant-eater has but two on the fore-feet, and four on the hind. As in the Sloths, the toes are inclosed in the skin, and are therefore incapable of separate motion, but this rigidity greatly increases the power of the foot as an instrument

for digging. As in those animals, also, the inflection of the long claws during rest renders the contact of the sole with the ground impossible; the Ant-eater rests entirely upon its outer edge, which is provided with a large callous pad for this purpose, and thus the claws are preserved from being worn and blunted in the action of walking.

Progression is, however, slowly performed; the utmost exertions of these animals not availing to equal the ordinary pace of a man in walking. The eyes are small, the ears short, and round, the legs robust and very powerful, in the peculiar sphere of action which the wisdom of God has assigned to them. The tail is lengthened: in the two smaller species it is in part prehensile, and these species have the faculty of climbing trees, where they search for the arboreal termites and ants, and for wild bees. The Great Ant-bear, however, (*Myrmecophaga jubata*, LINN.) has its tail, which it carries in an elevated position, covered with long flowing vertical hair, reminding one of that of a Newfoundland Dog.

This animal, the largest species of the genus, is spread over the continent of South America from Colombia to Paraguay. It measures four feet and a half from the muzzle to the tail; and the latter is upwards of three feet more: its height at the shoulders is about three feet and a quarter. The hair on the whole body is coarse and in some parts flattened, resembling withered grass: its prevailing colour is a mixture of deep brown with silvery grey; a broad band of black runs obliquely along each side.

“It is almost incredible,” says Azara, “that so robust and powerful an animal can procure suffi-

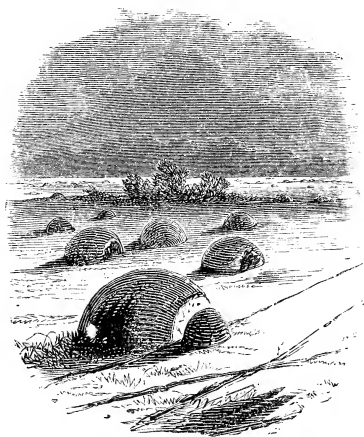
cient sustenance from ants alone ; but this circumstance has nothing strange in it for those who are acquainted with the tropical parts of America, and who have seen the enormous multitudes of these insects, which swarm in all parts of the



GREAT ANT-BEAR.

country to such a degree that their hills often almost touch one another for miles together." Dr. Schomburgk, however, informs us that in his attacks on the nests of the termites, or white-ants (for it is to these we presume that Azara alludes) the Ant-bear is an economist, and does not destroy more than he needs. When he finds that the termites cease to crowd to the surface in numbers, he examines the fragments he has pulled down,

using his left foot to hold the large lumps, while with his right he leisurely pulls them to pieces. This enterprising traveller domesticated an Ant-bear, which he fed upon beef and fish, chopped into pieces sufficiently minute to be taken with its small and narrow lips.



## SUB-CLASS II. MARSUPIALIA.

(*Pouched Animals.*)

MOST zoologists are now agreed that the animals we are about to consider, constitute a group, which, however limited in extent, is shewn by the importance of the characters by which it is distinguished to be equal in rank, not to an Order of *Mammalia*, but to all the other *Mammalia* combined. The most striking of these are the immature condition of the young at the time of birth, and its reception into a pouch (*marsupium*) or fold of the skin on the abdomen of the female, in which it is protected from exposure to the air and injury, while, suspended from the teat, to which it is very early attached, it gradually assumes the form of its adult condition, and acquires the powers necessary for its independent existence. For some time, however, after it is able to procure its own living, and to run and play by the side of its mother, the young marsupial instinctively flees to the maternal pouch for protection on the approach of danger.

But these are far from being the only characters in which the *Marsupialia* differ materially from the *Placentalia*. Important peculiarities in the reproductive organs, in the arterial system, and in the structure of the brain; the open condition of the skull, the bones of which remain per-

manently separate : the tendency to a multiplication of the teeth ; the presence of marsupial bones in the skeleton, even where the *marsupium* itself is not developed ; and the absence of a true voice,—all manifest a departure from the high development of the placental *Mammalia*, and an approach to that of the oviparous *Vertebrata* in general, and to that of the *Reptilia* in particular.

The Sub-class before us, though not to be compared with the *Placentalia* in the number of its members, contains animals differing widely from each other in the modifications of their structure, in their habits, and in the nature of the food whereby they are sustained. They even exhibit analogies, more or less distinct, to the principal Orders of the great division we have already considered : thus the Opossums, in their opposible thumbs, seem to represent the *Quadrumana*, the little *Myrmecobius* the *Insectivora*, and the Kangaroos the *Ruminantia* ; while more strongly drawn analogies exist between the *Dasyuri* (the “ Zebra-wolf, native-devil,” &c., of the Australian colonists) and the *Carnivora*, between the *Phalangistæ* and *Petauri*, and the *Rodentia*, and between the Duck-bill and Spiny ant-eater, and the *Edentata*. These, however, are not real affinities ; the characters which distinguish the *marsupial* from the *placental* animals, and which bind them together among themselves, being of greater importance than those in which they respectively resemble the Orders just enumerated.

It is remarkable that this division of *Mammalia* is almost entirely confined to one region of the globe, Australia, including New Guinea, and the islands immediately adjacent. An exception ex-

ists in the case of the Opossums, the most highly developed form of *Marsupialia*, whose home is South America, one or two species reaching into the southern provinces of the northern continent: and it is worthy of observation that the same region is the great abode of the lowest order of *Placentalia*, the *Edentata*; which we have just dismissed.

Mr. Waterhouse, whose attention has been much directed to these interesting animals, divides the sub-class into eight Families,—*Didelphidæ*, *Dasyuridæ*, *Myrmecobiidæ*, *Peramelidæ*, *Macropodidæ*, *Phalangistidæ*, *Phascolomyidæ*, and *Monotremata*. It may be doubted, indeed, whether these might not with propriety, take the rank of Orders, were it not for the limited number of the species, which makes it more convenient to consider them as Families. Perhaps, however, we may more correctly group the whole into two Orders; as the animals designated by the last term, seem to differ much more widely from all the others than those do from each other.



## ORDER I. MARSUPIATA.

## FAMILY I. DIDELPHIDÆ.

(Opossums.)

THE Opossums are small animals; the largest species scarcely equalling the domestic cat in size; while several are no larger than mice. They consist of about twenty species, most of which, as has been already stated, inhabit South America. The whole constitute but one genus, with the exception of a single species, which, from its aquatic habits, indicated by broad webbed feet, has been separated, under the name of *Cheironectes*. They are distinguished by the great number of their teeth, which are arranged as follows: inc.  $\frac{10}{8}$ ; can.  $\frac{1-1}{1-1}$ ; false molars  $\frac{3-3}{3-3}$ ; molars  $\frac{4-4}{4-4}$ ; = 50. The incisors are small, and disposed somewhat in the form of a semicircle; the canines are large and strong; the molars are crowned with sharp tubercles.

The feet have each five toes, armed with strong curved claws: the inner toe of the hind feet, however, is destitute of a claw, and is so placed as to be opposable to the others, thus constituting a true thumb.

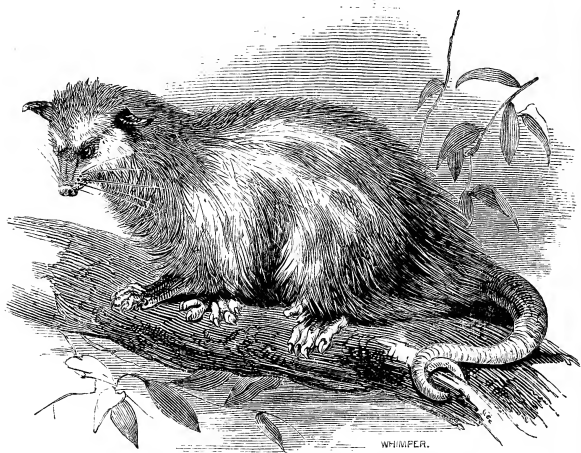
GENUS *DIDELPHYS*. (LINN.)

To the characters enumerated above, we may add, that the tail in the true Opossums is more or

less prehensile at the tip, and that in conformity with this structure, their habits are arboreal. The soles of the feet are covered with a naked skin of great sensibility: the ears and the tip of the muzzle are likewise naked. The fur is generally more or less woolly, and is not valued. In some species the pouch exists only in a rudimentary condition, as slight folds of the skin: "the young of these, when very small, remain attached to the nipple of the parent, but when of larger size, they quit this, and are carried on her back, where they hold themselves, by entwining their prehensile tails round that of the parent." In the British Museum there is a well-prepared specimen of *D. dorsigera*, (LINN.) which shews the young in this position.

The common Opossum of the United States, (*Didelphys Virginiana*, LINN.) is perhaps the best known species of the genus, as it is one of the largest and most characteristic. As early as 1649, it was thus described in the "Perfect Description of Virginia;"—"Passonnes.—This beast hath a bagge under her bellie, into which she taketh her young ones, if at any time they be affryghted, and carrieth them away." And Lawson states of the "Possum,"—"She is the wonder of all the land animals, being the size of a badger, and near that colour. The female, doubtless, breeds her young at her teats, for I have seen them stick fast thereto, when they have been no bigger than a small raspberry, and seemingly inanimate. She has a paunch, or false belly, wherein she carries her young, after they are from those teats, till they can shift for themselves. Their food is roots, poultry, or wild fruits. They have no hair

on their tails, but a sort of a scale, or hard crust, as the beavers have. If a cat has nine lives, this creature surely has nineteen; for if you break every bone in their skin, and mash their skull,



VIRGINIAN OPOSSUM.

leaving them for dead, you may come an hour after, and they will be gone quite away, or perhaps you may meet them creeping away. They are a very stupid creature, utterly neglecting their safety. They are most like rats of anything. I have, for necessity, in the wilderness, eaten of them. Their flesh is very white, and well-tasted; but their ugly tails put me out of conceit with that fare. They climb trees as the racoons do.

In the southern United States, where this animal

is very common, it is considered as “varmint,”\* (*vermin*) and disliked for its ravages in the poultry yards; where it sucks the blood without eating the flesh. It climbs trees readily, but crawls slowly on the earth: it is fond of hanging from a branch, suspended by the tail; and, thus pendent, frequently swings itself from bough to bough. When attacked, it will feign itself to be dead, when no beating will induce it to shew any signs of life; even dogs are deceived, and turning it over, pass it by. The initiated, however, maintain that they can at all times, even when the relaxation of the muscles of the body and limbs seems to be perfect, distinguish an Opossum in this singular state of hypocrisy from one really dead, by a living coil in the last joints of the tail, which is never resigned. From this curious habit, a person assuming a feigned character, is provincially said to be *'possuming*.

## FAMILY II. DASYURIDÆ.

(*Hairy-tails.*)

The most obvious distinction between the animals of this Family and the Opossums, consists in the tail being void of any prehensile power, and being thickly clothed with hair through its whole length. The form of the skull is, however, more dog-like; the canines are larger, more curved and pointed, and the incisors are fewer in number, eight only being found in the upper, and six in the lower jaw. The thumbs of the hind feet are either very small or altogether wanting.

\* The writer, when in Alabama, having on one occasion alluded to this animal as “a singular creature,” was corrected in the following terms: “A 'possum is not a crittur, but a varmint.”

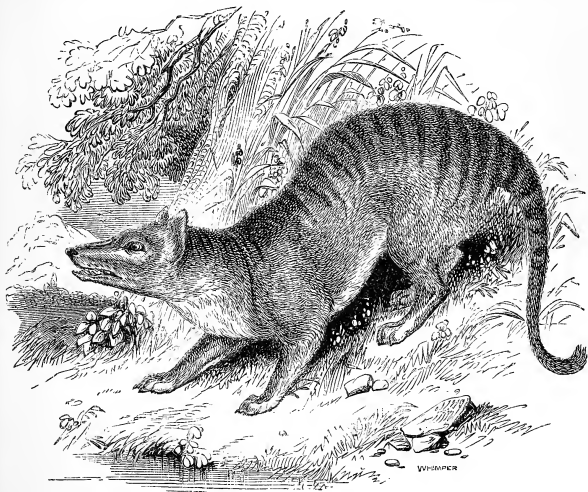
The animals of this Family vary in size from that of a wolf to that of a small mouse: the larger species are fierce and destructive, preying on the sheep and poultry of the settlers. They inhabit New South Wales and Van Diemen's Land.

### GENUS *THYLACINUS*. (TEMME.)

In this genus the teeth are thus arranged: inc.  $\frac{8}{6}$ ; can.  $\frac{1-1}{1-1}$ ; false mol.  $\frac{3-3}{3-3}$ ; mol.  $\frac{4-4}{4-4}$ ; = 46. The incisors in each jaw are disposed semicircularly, with a vacant space in the middle of the number; the external ones are the largest; they are much like those of a dog. The molars also closely resemble the "lacerators" in the true *Carnivora*. The feet are like those of a dog; the toes are short, naked, and very rough beneath; they are armed with short thick claws, slightly compressed. The thumb or inner toe is entirely wanting on the hind feet, even in the skeleton.

The only known species is the Zebra-wolf of the Australian settlers (*Thylacinus cynocephalus*, HARRIS) called also Native Tiger, Native Hyena, and Zebra-Opossum. It nearly equals a wolf in size, and is the largest carnivorous quadruped found wild in New Holland. The head is formed like that of a dog, with rather short, erect ears; the tail is thick at the base, but tapers to the point; it is about half as long as the body; the eyes are large, full, and black; the general colour of the fur is pale yellowish-brown, with numerous black bands across the back and haunches. Specimens occur which measure six feet in length, (including the tail, which is about two feet) and which stand about two feet high.

The Zebra-wolf was first described and figured by Mr. Harris in the Linnæan Transactions, under the name of *Didelphys cynocephalus*. Of its manners he states,—“It inhabits amongst caverns and rocks



ZEBRA-WOLF.

of the deep and almost impenetrable glens in the neighbourhood of the highest mountainous parts of Van Diemen's Land, where it probably preys on the Brush Kangaroo, and various small animals that abound in those places. That from which [his] description and the drawing accompanying it were taken, was caught in a trap baited with Kangaroo-flesh. It remained alive but a few hours, having received some internal hurt, in securing it. It from time to time uttered a short

guttural cry, and appeared exceedingly inactive and stupid; having, like the owl, an almost continual motion of the nictitant membrane of the eye. . . . In its stomach were found the partly-digested remains of a Porcupine-Ant-eater.”\*

It is said to be still numerous in the more remote parts of the colony, being often caught at Woolworth and the Hampshire hills. It usually attacks sheep in the night, but is also seen occasionally during the day-time, when its pace, probably owing to the imperfection of its sight by day, is very slow.†

### FAMILY III. MYRMECOBIADÆ.

The Family thus named was founded on a single specimen, and though two or three more individuals have since been sent to Europe, they are all of the same species. Its characters are as follow.

#### GENUS *MYRMECOBIUS*. (WATERHOUSE.)

The fore-feet are furnished with five toes each, which are armed with strong, curved claws, a little compressed: on the hind feet there are but four toes of a similar character, all free. The head is much lengthened, with a pointed snout; the ears are of moderate size, narrow, erect and pointed: the body is long and slender, the tail rather long, and clothed with loose hair. The number and arrangement of the teeth are thus expressed:—inc.  $\frac{8}{6}$ ; can.  $\frac{1-1}{1-1}$ ; false molars,  $\frac{4-4}{5-5}$ ; molars,  $\frac{4-4}{4-4}$ ;=52; a greater number than is found in any mammal,

\* Linn. Trans. ix. 174.

† Annals of N. H. 1838, p. 101.

with the exception of some among the Dolphins and Armadillos. The molars are small, and insectivorous in their form; the branches of the lower jaw are singularly twisted, so that the outer surfaces of the true molars come in contact with the grinding surface of those of the upper jaw.

The Banded Myrmecobius is a beautiful little creature, about as large as a Squirrel. The fore-



BANDED MYRMECOBIUS.

parts are of a bright rust-red, the hind parts nearly black; the body is elegantly marked with six or seven transverse bands of a cream colour, beautifully distinct and clear behind; the underparts are of a dull whitish hue. It has hitherto been obtained only at the Swan River colony.

This very interesting little animal was first made known by Lieutenant Dale of Liverpool, who discovered it while conducting an exploring party in the interior of the Swan River settlement, at the distance of about ninety miles to the south-east of the mouth of that river. "Two of these animals," observes Lieutenant Dale, "were seen within a few miles of each other: they were first observed on the ground, and on being pursued, both directed their flight to some hollow trees which were near. We succeeded in capturing one of them; the other was unfortunately burnt to death in our endeavour to dislodge it, by fumigating the hollow tree in which it had taken refuge. The country in which they were found, abounded in decayed trees and ant-hills." Mr. Waterhouse was informed that others have been seen in the act of burrowing, or digging at the roots of trees in search after insects. Their favourite haunts are said to be those in which the Port Jackson willow is abundant.

#### FAMILY IV. PERAMELIDÆ.

(*Bandicoots.*)

In their general structure the Perameles,—or Bandicoots, as they are called in Australia,—furnish a link between the Opossums and the Kangaroos, evidently approaching the latter in their form and particularly in the development of the hind-quarters. They agree with the former, however, in having a simple stomach, and in having ten incisors in the upper jaw. Insects have been found in the stomachs of some of the species, while others, as *P. lagotis*, (REID) seem to confine themselves

to vegetable food. In general in this family, the pouch is said to have the opening backwards, the reverse of what obtains in the other *Marsupialia*. In the species just named, however, it opens anteriorly.

The species are found on both sides of the Australian continent, in Van Diemen's Land, and in New Guinea.

### GENUS *PERAMELES*. (GEOFF.)

The head in this genus is lengthened and pointed, and the ears moderate, and well clothed with hair. The inner toes of the hind-feet are rudimentary, and the two middle toes are united by a common skin as far as the nails; in the fore-feet, the outer and inner toes are rudimentary, so that they appear to possess but three anterior toes. The claws are large, solid, and but slightly curved, and are well adapted to the burrowing habits of the animals. The teeth are as follows:—inc.  $\frac{10}{6}$ ; can.  $\frac{1-1}{1-1}$ ; false mol.  $\frac{3-3}{3-3}$ ; mol.  $\frac{4-4}{4-4} = 48$ .

“The Bandicoots appear to take in Australia the place of the shrews, tenrecs, and other *Insectivora* in the Old World. . . . Their general form and contour is rabbit-like, but the muzzle is elongated, narrow, and pointed, the nose advancing considerably beyond the jaw . . . . In their movements these animals resemble a rabbit; they do not, like the Kangaroo, bound from the hind-limbs alone, but, arching the back, proceed with a saltigrade gait, that is halfway between running and jumping; or rather by a succession of short leaps from the hind to the fore-feet, but not with much speed, nor maintained for a great length

of time. The Kangaroos make considerable use of the tail; but in the Bandicoots, it is by no means so important an organ, though it assists them in sitting upright, an attitude usually assumed when eating, the fore-paws being brought into use as holders, like those of the squirrel. With these paws they scratch up the earth in search of roots and insects, and it is said that the potatoe crops of the colonists in some districts suffer from their incursions. They are readily tamed, and in a few days become reconciled and familiar . . . . The form and characters of its teeth would lead us to suppose that the Bandicoot fed almost entirely upon insects, and similar creatures; and M. Geoffrey even imagines that it may use its long snout for the purpose of rooting up the earth, like a pig, in search of worms and grubs. The colonists, however, assert that these animals are chiefly if not purely, herbivorous; and that the principal part of their food consists of roots, which they dig up with their sharp and powerful claws. In the neighbourhood of human habitations they frequently enter into the granaries, and do as much mischief to the corn as the rats and mice of our own country.” \*

The prettiest species known is Gunn's Bandicoot (*Perameles Gunnii*, GRAY); which is rather larger than a rabbit, with short ears and tail; the general colour yellowish brown, with several alternate pale and black bands across the loins and rump.

Mr. Gunn's account of this pretty animal confirms the statement above alluded to of the vegetable food of the genus. He observes, “ They

\* Pict. Museum, i. 15.

are numerous everywhere (in Van Diemen's Land), they burrow in the ground universally, as far as I have seen, and live principally on roots. I knew one gentleman's entire collection of Cape bulbs,



GUNN'S BANDICOOT.

principally *Bambianææ*, eaten by them, and I suffered considerably myself, having lost some entire species of bulbs through these animals."\* On this, Mr. Waterhouse inquires, "May not these animals destroy the bulbs to get at insects with which they are infested?"

\* Annals of N. H. vol. ii.

## FAMILY V. MACROPODIDÆ.

*(Kangaroos.)*

The aspect of the Kangaroos is singularly striking, the anterior parts are light and graceful, while the posterior parts of the body, the hinder limbs, and the tail are very stout and muscular. The hinder feet are greatly lengthened: a naked callous pad runs along the whole sole from the heel to the toes. They are furnished with one very large middle toe, and an outer one, which is of somewhat less size; both of these are armed with large solid nails, slightly curved, convex, and sometimes ridged on the upper surface, and flat beneath; on the inner side of the foot are two other toes, very small and slender, and soldered as it were into one, being covered with a common skin; the bones, however, and the claws are distinct. The fore-feet have five toes each, of which the middle one is the longest; they are armed with large, strong, curved nails.

The attitudes and motions of these animals differ greatly from those of most other quadrupeds. In their ordinary position the body is nearly upright, the head and fore parts being elevated, and leaning a little forwards; the whole resting partly on the hinder limbs, the long soles of which are applied to the ground, and partly on the thick and muscular base of the tail.

When grazing, or proceeding leisurely, the small fore-feet are sometimes applied to the ground, and used in progression: but when the Kangaroo wishes to proceed rapidly, he uses

only the strong hind-feet, springing forward with enormous bounds, leaving his pursuers far behind.

The animals before us are exclusively herbivorous, grazing, like deer or antelopes, in the grassy plains of their native country, and associating in herds. Their disposition is mild and docile; and their physiognomy has much of that gentle expression which characterizes most of the Ruminants. The eye is large, full, and liquid, the ears large and erect, and the muzzle is taper. They are easily reconciled to confinement; bear our climate well, and breed freely in the parks of Europe.

#### GENUS *MACROPUS*. (SHAW.)

The characters of the Family are found most fully developed in the true Kangaroos, which are distinguished from the Kangaroo-rats by the total absence of canines, which in the latter are found in the upper jaw. The dentition is thus expressed: — inc.  $\frac{6}{2}$ ; can.  $\frac{0}{0}$ ; false mol.  $\frac{1-1}{1-1}$ ; mol.  $\frac{4-4}{4-4} = 28$ . In some species, however, the false molars are not present. There is a vacant space of considerable extent between the incisors and the molars: the latter have nearly square crowns, which, before they have become worn by grinding, present two transverse ridges.

The head is lengthened; the ears very large; the upper lip cleft; the whiskers short and few; the hind-limbs very robust; the tail long, very thick at the base, and well covered with hairs.

The stomach is large and sacculated; forming two long pouches, divided into cavities: balls of

agglutinated hairs, similar to the *bezoars* often found in goats and oxen, are occasionally met with in the stomach of the Kangaroo. A true ruminating power appears to be associated with the complex character of this organ; the animal ruminates in the erect posture, but the act does not take place with the same regularity and frequency as in the placental *Ruminantia*.

The young of the common Kangaroo, when born, is little more than an inch in length, including the tail, perfectly naked, and somewhat resembling in its colour and semi-transparency an earthworm. The hind-limbs are considerably shorter than the fore ones, the divisions of the toes, however, being distinct. When first presented to the nipple of the parent, its muscular powers are not sufficient to enable it to derive sustenance therefrom. There is, therefore, a peculiar muscle attached to the teat, which by its contraction, produces an injection of the milk into the mouth of the helpless young. But this provision of creative wisdom and care is not the only one that meets us here. Professor Owen has observed that the act of swallowing can scarcely be supposed to take place invariably at the same instant with the maternal action producing the flow of milk; yet, if at any time this should not be the case, the consequences might be fatal, from the reception of the fluid into the windpipe. To obviate this danger there is a special contrivance; the air-passage being continued in the form of a cone, which projects into the palate, and communicates with the nostrils, while it is completely shut up from the mouth; as it is in the *Cetacea*. Thus the injected milk passes down in a divided

stream, on each side of the windpipe, into the stomach.

“Thus aided and protected by modifications of structure,” observes Professor Owen, “both in the system of the mother, and in its own, designed with especial reference to each other’s peculiar condition, and affording, therefore, the most irrefragable evidence of creative foresight, the feeble offspring continues to increase from sustenance exclusively derived from the mother for a period of about eight months. The young Kangaroo may then be seen frequently to protrude its head from the mouth of the pouch, and to crop the grass, at the same time that the mother is browsing. Having thus acquired additional strength it quits the pouch, and hops at first with a feeble and vacillating gait, but continues to return to the pouch for occasional shelter and supplies of food till it has attained the weight of ten pounds. After this it will occasionally insert its head for the purpose of sucking.”

The great Kangaroo (*Macropus giganteus*, SHAW), the largest species yet known, was the first seen by Europeans. It was first discovered during Captain Cook’s first voyage, in 1770, on the coast of New South Wales. “On Friday, June 22nd,” says that navigator, “a party who were engaged in shooting pigeons for the use of the sick of the ship, saw an animal which they described to be as large as a greyhound, of a slender make, of a mouse-colour, and extremely swift.” The same animal was soon after seen by Captain Cook himself, and by Mr. Banks, and at length the wishes of the party to examine this extraordinary creature, were gratified, by the

shooting of a specimen by Mr. Gore; the individual from which the figure given in the voyage was drawn, and probably the same which afforded to Dr. Shaw the occasion of constituting the genus.



KANGAROO.

Pennant's account of the habits of this species is terse and accurate. "Inhabits the western side of New Holland, and has as yet been discovered in no other part of the world.\* The natives call

\* It is now ascertained to be extensively spread in the country intermediate between New South Wales and South Australia, and to be common also in Van Diemen's Land.

it Kanguru. It lurks among the grass; feeds on vegetables; drinks by lapping; goes chiefly on its hind legs, making use of the fore-feet only for digging, or bringing its food to its mouth. The dung is like that of a deer. It is very timid. At the sight of men flies from them by amazing leaps, springing over banks seven or eight feet high, and going progressively from rock to rock. It carries its tail quite at right angles with its body when it is in motion; and when it alights often looks back; it is much too swift for greyhounds; is very good eating, according to our first navigators; but the old ones, according to the report of more recent voyagers, were lean, coarse, and tough. The weapon of defence was its tail, with which it would beat away the strongest dog.

“In the spring of the present year [1793] I had an opportunity of observing the manners of one brought into the capital alive. It was in full health, very active, and very mild and good-natured: on first coming out of its place of confinement, it for a little time went on all-fours, but soon assumed an upright attitude. It would sport with its keeper in a very singular manner; it first placed its tail in a perpendicular manner, erected its body on it as a prop, and then raising its whole body, darted its hind-legs on the breast of the man. It was capable of striking with great force, if provoked; and it could scratch violently with its fore-claws.”

The Great Kangaroo does not make use of its tail in leaping, but in walking, and still more in standing: the male, when excited, will sometimes stand on tip-toe and on his tail, and is then

of prodigious height. In fighting, he does not stand on the tail and one leg, but balances himself for a moment on the tail only, and strikes forward with both hind-legs. The male attains a much greater size than the female; measuring nearly eight feet in total length, of which the tail may appropriate a little more than three feet: the height of an individual of these dimensions, when in the ordinary erect attitude, would be upwards of five feet.

The excellence of the flesh of the Kangaroo, which is considered equal to that of venison, is appreciated by the natives as well as the colonists in New Holland. "The native employs several modes of obtaining it. Sometimes he steals upon it under the covert of the trees and bushes, till within range of his unerring spear. Sometimes numbers of men unite in a large party, and, forming a circle, gradually close in upon the animals with shouts and yells, by which the animals are so terrified and confused, that they easily become victims to the bommerengs, clubs, and spears which are directed from all sides against them." The European settler pursues it, *secundum artem*, with horses and hounds. A breed of dogs, crossed between the bull-dog and the greyhound, fierce, powerful, and of great fleetness, are used for the course. Mr. Gould states that many of these dogs are kept at the stock-stations in the interior for the sole purposes of hunting the Kangaroo and the Emu. The same gentleman speaks of the formidable resistance which the former animal is able to offer to the dogs. "Although," he says, "I have killed the largest males with a single dog, it is not advisable

to attempt this, as they possess great power, and frequently rip up the dogs, and sometimes cut them to the heart with a single stroke of the hind leg. Three or four dogs are generally laid on, one of superior fleetness to pull the Kangaroo, while the others rush in upon and kill it. It sometimes adopts a singular mode of defending itself by clasping its short but powerful arms around its antagonist, leaping away with it to the nearest water-hole, and there keeping it beneath the surface until drowned. With dogs the old males will do this whenever they have an opportunity, and it is also said that they will attempt the same with man."

Mr. Gunn and Mr. Gregson speak of the excellent sport which the "Boomer," as the Great Kangaroo is there called, affords in the open plains of Van Diemen's Land. The latter thus describes a chase, in a letter to Mr. Gould. "I recollect one day in particular, when a very fine *boomer* jumped up in the very middle of the hounds, in the open. He at first took a few high jumps with his head up, and then, without a moment's hesitation, he stooped forward, and shot away from the hounds apparently without effort, and gave us the longest run I ever saw after a Kangaroo. He ran fourteen miles by the map, from point to point, and if he had had fair play, I have little doubt that he would have beaten us. But he had taken along a tongue of land that ran into the sea, so that on being hard pressed, he was forced to try to swim across the arm of the sea, which cannot have been less than two miles broad. In spite of a fresh breeze, and a head-sea against him, he got fully half way over; but he could not make head

against the waves any farther, and was obliged to turn back; when, being quite exhausted, he was soon killed. The distance he ran, taking the different bends of the line, was not less than eighteen miles." When he took to the water he was a long distance before the hounds, but still quite fresh. The hind-quarters weighed seventy pounds. "We did not measure the distance of the hop of this Kangaroo, but on another occasion, in which the boomer had taken along the beach, and left his prints in the sand, the length of each jump was found to be fifteen feet, and as regular as if they had been stepped by a sergeant. When a boomer is pressed, he is very apt to take to the water, and then it requires several good dogs to kill him; for he stands waiting for them, and as they swim up to the attack, he takes hold of them with his forefeet, and holds them under water. The buck is very bold, and will generally make a stout resistance; for, if he cannot get to the water, he will place his back against a tree, so that he cannot be attacked from behind; and then the best dog will find him a formidable antagonist. The doe, on the contrary, is a very timid creature; and I have even seen one die of fear."

Perhaps it is scarcely correct to speak of the Great Kangaroo as being gregarious. From the circumstance of their favourite food being found in particular spots, such as pieces of land recently burnt over, they are often seen assembled together; yet they never associate in flocks, properly so called, all moving together. The sort of country which they prefer consists of low grassy hills or plains skirted by thin open forests of brushwood, or patches of high ferns, tall grass, or under-

wood, known by the term *scrubs*, in which they shelter themselves during the heat of the day.

Of a very beautiful species, somewhat less than the preceding, the White-tailed Kangaroo (*Macropus Parryi*, BENNETT), Sir Edward Parry has given some interesting details. It was caught by the natives near Port Stephens, in New South Wales; having been thrown out of its mother's pouch when the latter was hunted. At that time it was somewhat less than a rabbit; but having continued in the possession of Sir Edward Parry for more than two years in New South Wales, besides six months on the passage to England, it was considered (when this account was published) as full-grown. It had never been kept in confinement until it was embarked for England, but lived in the kitchen, and ran about the house and grounds like a dog, going out every night after dark into the "bush," or forest, to feed; and usually returned to its friend, the man-cook, in whose bed it slept, about two o'clock in the morning. Besides what it might obtain in these excursions, it ate meat, bread, vegetables; in short, everything given to it by the cook, with whom it was extremely tame, but would allow nobody else to take liberties with it. It expressed its anger when very closely approached by others, by a sort of half-grunting, half-hissing, very discordant sound, which appeared to come from the throat, without altering the expression of the countenance. In the daytime it would occasionally, but not often, venture out to a considerable distance from home; in which case it would sometimes be chased back by strange dogs, especially those belonging to the natives. From

these, however, it had no difficulty in escaping, through its extreme swiftness; and it was curious to see it bounding up a hill, and over the garden-fence, until it had placed itself under the protection of the dogs belonging to the house, especially two of the Newfoundland breed, to which it was attached, and which never failed to afford it their assistance by sallying forth in pursuit of its adversaries.

Specimens of this beautiful species, as well as of the Great Kangaroo, and of several other kinds, have at different times lived in the menagerie of the Zoological Society of London; as also in the splendid menagerie of the Earl of Derby, at Knowsley Park.

## FAMILY VI. PHALANGISTADÆ.

(*Phalangers.*)

The pretty little animals of this group bear a very obvious analogy to the Squirrels of the *Placentalia*. Yet in true *affinity*, they are closely related to the Kangaroos, which we have just dismissed, the small Kangaroo-rats (*Hypsiprymnus*) affording the connecting link.

The *Phalangistadæ* possess small canines in the upper jaw; the incisors in both jaws are inclined forward, and those below, and the middle pair above are large and long: the skull in front is shorter, but posteriorly longer than in the preceding Family. The hind-feet have four well-developed toes, all armed with large curved claws, the innermost two of which are united; besides these there is a large opposable thumb, which is

destitute of a claw. The fore-feet have five toes, all furnished with strong claws.

The species of this Family have a wider geographical range than most of the *Marsupialia*; for they extend from Van Diemen's Land to the Moluccas or Spice Islands of the great Indian Archipelago. They are arboreal animals, and consequently are expert climbers, though, contrary to what is usual among climbing animals, their movements are not distinguished by agility. Night is the season of their activity: during the day, they remain concealed in the forks and hollows of the trees, coming forth in the twilight to feed upon the unopened buds and tender leaves, or upon fruits. The species of Van Diemen's Land chiefly select the leaves of the *Eucalypti*, but Mr. Gunn observes that in the interior the orchards sometimes suffer from the depredations of these animals on the leaves and young shoots. Some specimens procured by MM. Quoy and Gaimard in the Oriental Archipelago, which are said to feed on aromatic fruits, they found in confinement not to refuse cooked flesh.

This Family contains three well-defined genera: *Phalangista*, which has the tail prehensile, *Petaurus*, which has the skin of the sides expanded between the fore and hind limbs, by means of which they can take long leaps supported in the air as by a parachute; and *Phascolarctos*, a heavy-bodied animal, destitute of a tail. The first two of these bear the same relation to each other as the common Squirrels bear to the Flying Squirrels.

GENUS *PHALANGISTA*. (CUV.)

The Phalangers are distinguished by having the head rather short; the ears hairy; the fur woolly and short; the tail long, prehensile, sometimes naked at the extremity; the skin of the sides not dilated between the limbs. The arrangement of the teeth is as follows; inc.  $\frac{6}{2}$ ; can.  $\frac{1-1}{0-0}$ ; false mol.  $\frac{1-1}{1-1}$ ; mol.  $\frac{4-4}{4-4}$ ; =30: these may be called the constant teeth, but in several species, there are additional small molars, sometimes resembling canines, varying in number from one to three in each jaw.

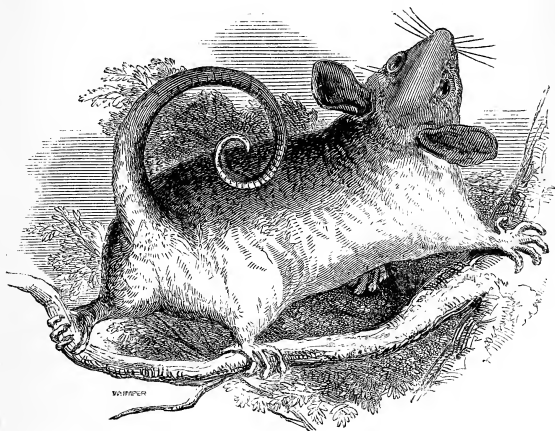
Notwithstanding the security afforded them by a prehensile tail, the Phalangers are slow and cautious in their motions among the branches. If they suspect themselves to be observed, they are said to suspend themselves by the tail to a branch, and hang with the head downwards, motionless, as if dead; and this artifice is the less improbable, from what we know of the American Opossum's analogous stratagem. It is reported, indeed, that if a man continue to watch one thus suspended, it will continue to hang till the muscles of the tail, no longer able to sustain the weight, relax from extreme fatigue, and the creature drops to the ground.

The flesh of these animals is of delicate flavour; and the fur is highly prized for its thickness and softness; during life, they diffuse an unpleasant odour, like many other marsupial animals.

A very pretty and minute species, the Dormouse Phalanger, (*Phalangista gliriformis*, BELL) from New Holland, we select for illustration, on

account of the pleasing details which Mr. Bell has recorded of the manners of some individuals which he kept in confinement. In size, colour, and general form, it bears a considerable resemblance to the beautiful little rodent after which it is named; the form of the head, however, is different, the nose being much more lengthened and pointed.

“In their habits,” observes Mr. Bell, “they are extremely like the dormouse, feeding on nuts



DORMOUSE PHALANGER.

and other similar food, which they hold in their fore-paws, using them as hands. They are nocturnal, remaining asleep during the whole day, or, if disturbed, not easily roused to a state of activity; and coming forth late in the evening, and

then assuming their natural rapid and vivacious habits: they run about a small tree which is placed in their cage, using their paws to hold by the branches, and assisting themselves by their prehensile tail, which is always held in readiness to support them, especially when in a descending attitude. Sometimes the tail is thrown in a reverse direction, turned over the back; and at other times, when the weather is cold, it is rolled closely up towards the under part, and coiled almost between the thighs. When eating they sit upon their hind-quarters, holding the food in their fore-paws, which, with the face, are the only parts apparently standing out from the ball of fur, of which the body seems at that time to be composed. They are perfectly harmless and tame, permitting any one to hold and caress them, without ever attempting to bite; but do not evince the least attachment either to persons about them, or even to each other.”\*

### GENUS *PETAURUS*. (SHAW.)

Besides the very obvious character which the Flying Phalangers possess in the lateral expansions of the skin, covered with hair; they are distinguished also by having the ears small and hairy, the fur very long and soft; and the tail long, free, and destitute of prehensile power. In the section to which the Squirrel Phalanger (*Petaurus sciureus*, SHAW) or Sugar Squirrel of the colonists, belongs, the teeth are thus arranged:—inc.  $\frac{6}{2}$ ; can.  $\frac{1-1}{0-0}$ ; false mol.  $\frac{3-3}{4-4}$ ; mol.  $\frac{4-4}{4-4}$ ; = 40; but in other species the

\* Trans. Linn. Soc. xvi. 121.

number of false molars varies. All the species known appear to be confined to the Australian continent.

“During the day,” observes Mr. Bennett of this pretty animal, “it generally remains quietly nestled in the hollows of trees, but becomes animated as night advances, and skims through the air, supported by its lateral expansions, half leaping, half flying, from branch to branch, feeding upon leaves and insects. This peculiar mode of locomotion



SQUIRREL PHALANGER.

can scarcely be considered as a true flight, inasmuch as the cutaneous folds which serve the purposes of wings seem rather destined for the mere support of the animal in its long and apparently desperate leaps, than for raising it in the air, and directing its course towards any given object. For this latter purpose they are indeed but little fitted by their structure, the want of proper muscles in

a great measure incapacitating them from performing such offices as are dependent on volition. It may be doubted, however, whether these animals are entirely destitute of the power of exercising their will in their flight-like leaps. For the following anecdote bearing upon this subject we are indebted to our friend Mr. Broderip, who related it to us on unquestionable authority. On board a vessel sailing off the coast of New Holland, was a Squirrel *Petaurus*, which was permitted to roam about the ship. On one occasion it reached the mast-head, and, as the sailor who was despatched to bring it down approached, made a spring from aloft, to avoid him. At this moment the ship gave a heavy lurch, which, if the original direction of the little creature's course had been continued, must have plunged it into the sea. All who witnessed the scene were in pain for its safety: but it suddenly appeared to check itself, and so to modify its career that it alighted safely on the deck."

These beautiful little animals have been kept in captivity in this country. They are active and sportive by night, but rather shy and timid; during the day they remain rolled up in their nests of wool or other warm materials, in a state of slumber; but on the approach of dusk become animated, leaping from side to side of their cage with great agility. In their native countries they are said to associate in small flocks, concealing themselves by day in hollow trees. Their ærial evolutions, when the shades of evening have roused them from their inactivity are described as being peculiarly graceful, their limbs stretched out horizontally, and their long well-furred tails quivering behind like

a streamer, as they launch themselves on their bold and seemingly perilous leaps.

This species, whose fur is exquisitely soft and full, is of a delicate grey colour, with a line down the back, and the borders of the lateral membranes, dark brown. It is a native of New South Wales, and is said to be abundant at the foot of the Blue Mountains. The skins are sent to this country as an article of commerce.

### GENUS *PHASCOLARCTOS*. (DESM.)

This genus, of which only a single species has been recognised, differs but slightly from *Phalangista* in its dentition and anatomy; but its superior size, its clumsy form and gait, its shaggy ears, and the absence of a tail, render it distinguishable at a glance from every other member of this Family. It is a robust animal, with thick limbs and powerful claws; the head is large and round, with a blunt muzzle; the ears are broad, and stand out from the sides of the head, in a singular manner; they are clothed with long, bushy fur. The feet have each five toes, armed with large, sharp, curved claws: the fore-feet have this peculiarity, that the innermost two toes are a pair by themselves, as it were two thumbs, being opposable to the other three.

The only known species is the Koala, or Native Bear of the colonists (*Phascolarctos fuscus*, DESM.), which is a little more than two feet in length, covered with a thick compact wool, of an ashy-grey colour, patched with white on the hinder parts. It is said to resemble a bear, in its gait upon the ground, and in its mode of climbing. The some-

what inconsistent habits of climbing trees and of burrowing in the earth at their feet, are attributed to it. In the winter it is said to form a nest in its underground retreat, retiring into it to pass away the cold season in sleep. If this is correct, it adds another particular to the analogies that exist be-



KOALA.

tween it and the bears. It is also said to pass along the branches of trees with great facility, in the manner of a Sloth, suspended by its sharp and powerful claws. Vegetable substances constitute its sole nutriment; a considerable portion of which is derived from the young leaves of the gum-trees (*Eucalyptus*). It makes use of its fore-paws to lay hold of the branches while it is feeding. In drinking it laps like a dog. Its voice is a soft

barking sound. The female carries her young one, when able to leave the pouch, clinging to her back, for some time.

The Koala inhabits New South Wales, where, however, it appears to be somewhat uncommon. The first individuals that were known in the colonies were brought in by natives to Colonel Patterson, then lieutenant-governor of the colony, from the Hat-Hill district, to the southward of Port Jackson, in 1803. The native name, 'Koala,' is said to signify 'Biter.'\*

## FAMILY VII. PHASCOLOMYIDÆ.

(*Wombats.*)

In the single species, which, as far as is yet known, constitutes the only representative now living of the Family before us, we find the dentition of the true *Rodentia*: the incisors being long, curved, projecting forwards, having a chisel-edge, deeply implanted in their respective sockets and hollow at the base. These teeth as well as the molars, continue to grow at the base, as they are worn down by use at the upper part, being destitute of roots. The canines are wanting. The skull is massive and heavy, and its structure throughout manifests that the muscles required in mastication are very powerful. The feet have five toes each, armed with strong claws adapted for burrowing; the inner toe of the hind-foot, however, which is very minute, and set on, as in other marsupials, nearly at a right-angle, is destitute of a claw.

\* Penny Cycl. Art. MARSUPIALIA.

GENUS *PHASCOLOMYS*. (GEOFF.)

The general form of this animal strongly reminds one of some of the Cavies, but is more clumsy and massive. The head is large and bluff,



WIMPER

WOMBAT.

with the upper part flattened; the eyes very small, the ears also small and pointed; the nostrils widely separated. The limbs are short; the feet broad, and naked beneath; the claws large and solid, those of the fore-feet but slightly curved, and, as has been said above, formed for digging.

The arrangement of the teeth may be thus expressed:—inc.  $\frac{2}{2}$ ; can.  $\frac{0}{0}$ ; mol.  $\frac{5-5}{5-5} = 24$ .

The only known species of the genus is that called by the natives of Australia the Wombat or Wombach, (*Phascolomys Wombat*, PERON,) which is found scattered over the whole southern part of New Holland and Van Diemen's Land. It was discovered in 1798, on an island near the coast of New South Wales, by Captain Bass, from whose Journal we extract the following graphic details of its form and manners:—

“The *Wombat*, or, as it is called by the natives of Port Jackson, the *Wombach*, is a squat, short, thick, short-legged, rather inactive quadruped, with great appearance of stumpy strength, and somewhat bigger than a large turnspit dog. Its figure and movements, if they do not exactly resemble those of the bear, at least strongly remind one of that animal . . . . The hair is coarse, and about one inch and a-half in length, thinly set upon the belly, thicker on the back and head, and thickest upon the loins and rump; the colour of it a light and sandy brown of varying shades, but darkest along the back.”

“This animal has not any claim to swiftness of foot, as most men could run it down. Its pace is hobbling or shuffling, something like the awkward gait of a bear. In disposition it is mild and gentle, as becomes a grass-eater; but it bites hard, and is furious when provoked. Mr. Bass never heard its voice but at that time: it was a low cry between a hissing and a whizzing, which could not be heard at a distance of more than thirty or forty yards. He chased one, and with his hands under his belly, suddenly lifted him off the ground without hurting him, and laid him upon his back, along his arm, like a child. It made no noise,

nor any effort to escape, not even a struggle. Its countenance was placid and undisturbed, and it seemed as contented, as if it had been nursed by Mr. Bass from its infancy. He carried the beast upwards of a mile, and often shifted him from arm to arm, sometimes laying him upon his shoulder, all of which he took in good part; until, being obliged to secure his legs, while he went into the bush to cut a specimen of a new wood, the creature's anger arose with the pinching of the twine; he whizzed with all his might, kicked and scratched most furiously, and snapped off a piece from the elbow of Mr. Bass's jacket with his grass-cutting teeth. Their friendship was here at an end, and the creature remained implacable all the way to the boat, ceasing to kick only when he was exhausted. This circumstance seems to indicate that, with kind treatment the Wombat might soon be rendered extremely docile; but let his tutor beware of giving him provocation, at least if he should be full-grown. Besides Furneaux's Islands, the Wombat inhabits, as has been seen, the mountains to the westward of Port Jackson. In both these places its habitation is underground, [the animal] being admirably formed for burrowing; but to what depth it descends does not seem to be ascertained. According to the account given of it by the natives, the Wombat of the mountains is never seen during the day, but lives retired in his hole; feeding only in the night; but that of the islands is seen to feed in all parts of the day. His food is not yet well known; but it seems probable that he varies it according to the situation in which he may be placed. The stomachs of such as Mr.

Bass examined were distended with the coarse wiry grass; and he, as well as others, had seen the animal scratching among the dry ricks of seaweed thrown up upon the shores, but could never discover what it was in search of. Now the inhabitant of the mountains can have no recourse to the sea-shore for his food, nor can he find there any wiry grass of the islands, but must live upon the food that circumstances present to him."

Mr. George Bennett, in his "Wanderings in New South Wales," has confirmed the supposition that the Wombat is not confined to one sort of vegetable food. Of one which was kept in a state of domestication, at Been, in the Tumat country, he observes, "It would remain in its habitation till dark; it would then come out and seek for the milk vessels, and should none be uncovered it would contrive to get off the covers, and bathe itself in the milk, drinking at the same time. It would also enter the little vegetable-garden attached to the station, in search of lettuces, for which it evinced much partiality. If none could be found, it would gnaw the cabbage-stalks without touching the foliage. Although these animals were numerous in the more distant parts of the colony, they are difficult to procure, from the great depth to which they burrow."

The indifference manifested by Mr. Bass's Wombat to its being handled, and carried with the back downward, must be regarded as an indication of a very low degree of intelligence. Until there was actual pain, the animal was placidly content in its novel circumstances, manifesting none of that anxiety and fear that animals of higher intelligence display when suddenly placed in unusual places or

positions. Nor is this a solitary case. Mr. Bass himself, in a note to the above account, observes that "the Kangaroo and some other animals in New South Wales were remarkable for being domesticated *as soon as taken*." Indeed, the whole of the *Marsupialia*, though some are of active and sprightly manners, present but little appearance of real docility or intelligence; and this fact, connected with the low degree of development of their brain, helps to prove their inferior rank to the placental *Mammalia*.

The flesh of the Wombat is described as being excellent meat; and as it is of considerable size, attaining the length of three feet, it might be worth naturalizing in this country. This would probably be effected without any difficulty: specimens that have been brought to Europe, having lived for several years as domestic pets. The individual that was dissected by Professor Owen in 1836, and which was the subject of a valuable Memoir by him, on its anatomy, had been in the Gardens of the Zoological Society between five and six years.

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## ORDER II. MONOTREMATA.

*(Beaked Marsupials.)*

WE have now arrived at creatures of so strange and anomalous structure, as to have given rise to much discussion among men of science concerning their true affinities, and the Class of animals to which they properly belonged. When the most singular of these animals was first received in England, the union of a beak closely resembling that of some Ducks, with the body of a fur-clothed quadruped, was so startling a novelty, that the utmost suspicion was roused of its genuineness; and though repeated and careful examinations of the specimen were instituted, even to the maceration of the suspected organs in water, it was not until other individuals were sent from New Holland, that zoologists were satisfied that no clever artifice had been employed in "making up" the specimen.

Recent investigations have proved that the peculiar organization of these animals is not confined to their external form; and if more extended inquiries have familiarized us with their structure, and so diminished our wonder at its unwonted combinations, they have brought more fully to view, in many anatomical particulars, that these creatures are indeed unique, and possess peculiarities which broadly separate them from all other known animals.

From the nature of these peculiarities, they

cannot be enumerated in a treatise like the present: suffice it to observe, that in the form of the skull, in the construction of the shoulder, and of the breast-bone, but particularly in the whole reproductive system of organs, the *Monotremata* present a manifest departure from a mammalian type, and a correspondent approach to that of the oviparous Vertebrata, tending to the Reptiles, more than to the Birds.

At the same time the preponderance of their organization shews, that notwithstanding their anomalies, they are truly *Mammalia*; and though they do not possess any external trace of an abdominal pouch, the presence of the marsupial bones in the skeleton, and many other details of their anatomy, sufficiently declare that their nearest affinities are with the *Marsupialia*, of which they constitute the lowest and most aberrant type.

In these singular animals there are no true teeth, though one genus possesses horny substances in the jaw which represent those organs; the muzzle is produced into a long and flat beak, more or less resembling that of a duck; the eyes are small; the ears are merely minute orifices, destitute of external conch; the limbs are short and strong, adapted for digging; the feet have each five toes, furnished with stout claws, and on the hind feet is a sort of sharp spur, which has been supposed, but as it seems erroneously, to be a weapon of defence.

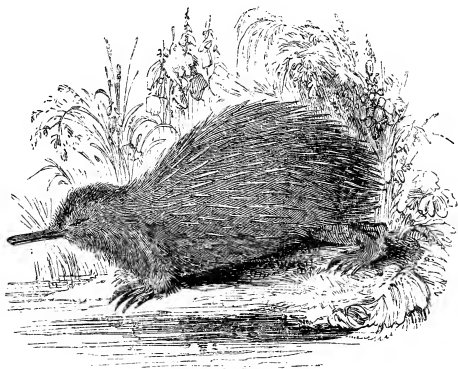
The order contains two genera, *Echidna* and *Ornithorhynchus*; both of which are confined to New Holland and Van Diemen's Land.

GENUS *ECHIDNA*. (CUV.)

In some respects the muzzle of this animal resembles that of the Ant-eaters, being much elongated, slender, terminated by a small mouth, and inclosing a long extensile tongue. It is, however, much more beak-like: immediately in front of the eyes, the muzzle, which is rather depressed, is suddenly contracted, and thence tapers gradually to the tip. The skin of this beak is thick and destitute of hair. It has no teeth, but the palate is armed with many rows of small spines directed backwards. The limbs are very large and robust, and formed for burrowing, or for opening ant-nests, being furnished with very long and strong nails. "The inner toe of the hind-foot," says Mr. Waterhouse, "is very short and thick, and furnished with a short, broad, and rounded nail, and appears to be slightly opposable; the toe next the inner one is the largest, though still short and strong, and is furnished with an enormously long nail, one inch and four lines in length; this nail is slightly curved, and appears, when viewed in front, to be nearly cylindrical, but its under surface is concave. The nail of the central toe resembles the last, but is rather smaller, and that of the outer toe is the shortest, being not more than a quarter of an inch in length. The *Echidna* being a burrowing animal, it would appear that the broad, strong claws of the fore-feet are for digging out the earth, and the large hollow claws of the hind-feet are to enable the animal to cast away the loose soil; and to accomplish this, the foot is twisted in such a manner that the sides of these

claws lie on the ground, and the concave part is behind."

The upper surface of the body, and of the short tuberculous tail, is covered by a compact mass of stout and strong spines, intermingled with stiff bristly hairs. For the most part they are directed backwards, but towards the middle of the back their points cross each other; but when alarmed the animal has the power of rolling itself up like the hedgehog, when the strong spines project in all directions as from a common centre.



ECHIDNA.

There appears to be but a single species (*Echidna aculeata*, SHAW.) which is found in New South Wales and in Van Diemen's Land. A second species (*E. setosa*, DESM.) has indeed been described, which is said to be distinguished by having fewer and shorter spines on the body, and these are imbedded almost to the points in a

dense, woolly, brown fur;—but these diversities are more generally considered as seasonal variations.

The length of the *Echidna* (the Hedgehog of the colonists), is about one foot; the colour of the spines is a dirty yellowish-white, with blackish tips; that of the stiff hair with which the rest of the body and limbs are clothed is a blackish-brown. Its food consists of ants with their larvæ and pupæ, which, like the true Ant-eaters, it takes by means of a long worm-like tongue, which it can protrude to a great distance, and which is always covered with an adhesive secretion. Its powers of burrowing are very great. Messrs. Bass and Flinders state that their dogs, having found one of these “Porcupine Ant-eaters,” could make no impression on the animal, which escaped by burrowing in the loose sand, not head-foremost, but by sinking itself directly downwards, and thus presenting nothing but its prickly back to its assailants. And according to Mr. G. Bennett, it will even work its way under a pretty strong pavement or base of a wall, removing the stones with its claws. During these exertions its body is stretched or lengthened to an uncommon degree, and appears very different from the short plump aspect, which it bears in its undisturbed state.

Messrs. Quoy and Gaimard, who procured one of these animals in Van Diemen’s Land, have given an account of its manners while in their possession. They describe it as stupid and listless; for a month after its capture, it refused all sustenance, from which it did not appear to suffer, though it became very meagre. It sought the darkest places, shunning the light of day; or

remained with its head crouched between its fore-legs; in which position it presented at all points a mass of spines. They deny to it, however, the power of rolling itself up into a ball. Notwithstanding its ordinary apathy, it appeared to appreciate the sweets of liberty, making incessant efforts to escape from its cage. The readiness with which it burrowed was surprising: being placed on a large box of earth, containing plants, it penetrated to the very bottom in less than two minutes: the muzzle, though very sensitive, assisted in the performance of this operation.

After its first abstinence, which lasted for a month, it began to eat; it was fed with a mixture of sugar, flour, and water, of which it consumed nearly half a glass every day. It at length died, in consequence, as was supposed, of its too frequent ablutions; but these naturalists think that the animal may be easily brought to Europe; particularly as it becomes torpid during the prevalence of cold weather.

The same opinion is expressed by Lieutenant Breton, notwithstanding the failure of his own attempt, by the death of an individual which he was endeavouring to bring alive to England. In a communication made by him to the Zoological Society, and published in their Proceedings for 1834, that gentleman has added to our information some interesting notes of this singular animal. Previously to embarkation, this individual was fed on ant-eggs and milk, and when on board its diet was egg, chopped small, with liver and meat. It drank much water. Its mode of eating was very curious, the tongue being used at

some times in the manner of that of the chameleon, and at others, in that in which a mower uses his scythe, the tongue being curved laterally, and the food, as it were, *swept* into the mouth; there seemed to be an adhesive substance on the tongue, by which the food was drawn in. The animal died suddenly, off Cape Horn, while the vessel was amidst the ice; perhaps in consequence of the cold, but not improbably on account of the eggs, with which it was fed, being extremely bad.

This individual was captured on the Blue Mountains; it is become uncommon in the inhabited parts of New South Wales. Mr. Bennett states, that it inhabits the mountain ranges of Australia; and that it brings forth its young in December. It is believed to be nocturnal in its habits. Its flesh is eaten by the natives, and is said to resemble in flavour that of sucking-pig.

#### GENUS *ORNITHORHYNCHUS*. (BLUM.)

The impression which would be produced by the sight of this most singular of all quadrupeds, on one who had never heard of it, would be, that the beak of a shoveller-duck had been artificially fastened on the front of the head of a small otter. The beak is flat, broader at the tip than at the base, and covered by a thick leathery skin; between the base and the head, this skin projects in the form of a loose flap from each mandible, which probably serves to protect the eyes from the mud, in which the animal is perpetually dabbling, in search of food. The skin on the sides of the lower mandible is indented with numerous

transverse furrows. There are no true teeth; but at the back of each mandible, in the ordinary place of molars, are two horny appendages, resembling teeth, but without roots, which are of a somewhat square form, and have a broad, uneven surface, calculated for crushing rather than grinding. Beneath the skin of the face are capacious cheek-pouches, for the carrying of food. The eyes are bright, but very small, and situated high on the forehead. The ears are mere orifices, easily discernible during life, being opened and closed by the will of the animal, but scarcely to be perceived in dead specimens.

On both the fore and hind-feet are five well-developed toes, all armed with long, curved, and pointed claws. They are all connected by a leathery web, which in the fore-feet extends considerably beyond the tips of the claws, presenting a broad and powerful oar when in the water, but folded back when the animal is engaged in digging the earth. On the hind-feet the web reaches only to the extremities of the toes. The hind-feet are armed also with a stout, sharp, moveable spur, which was formerly regarded as highly poisonous; the experiments of Mr. Bennett, however, prove that no use is made of it in defence, and that scratches produced accidentally by it, are followed by no ill effects. In the male alone is this spur well developed.

The body is somewhat flattened, bearing some resemblance to that of a small otter; the tail is broad and depressed.

Two species have been described under the names of *Ornithorhynchus fuscus*, and *O. rufus*; the distinctions, however, are very slight, the

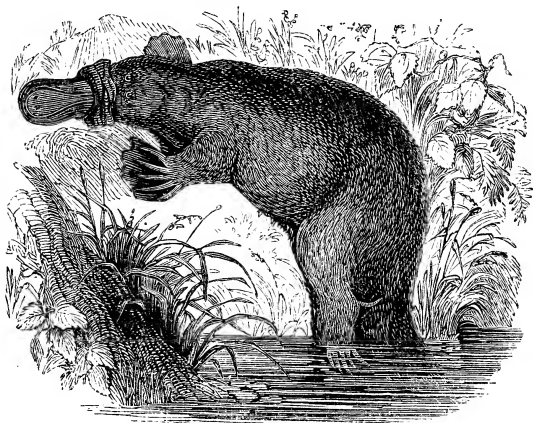
latter having the fur softer, and of a redder tint than the former; and naturalists are not yet agreed, whether these are to be regarded as constituting differences of species, or but of varieties. We shall, therefore, speak of the *Ornithorhynchus*, without distinguishing.

Mr. Waterhouse has described some curious peculiarities in the structure of the fur. "The fur is short, very dense, and rather soft to the touch; and combines the properties usually found in that of an aquatic animal, and that of one whose habit is to burrow: it will readily expel both the water and the dust; it is composed of hairs of two kinds, the one forming a remarkably fine and dense fur, resembling that of the mole; the other hairs are longer, have the basal half fine like the under fur, but the apical, exposed half of each hair is *dilated and flat*, bent at an angle with the basal portion, and is very glossy, resembling the hairs of the seal. In these longer hairs, being thin at the base, bent near the middle, and expanded and stiff at the tip, we see a beautiful provision suited to the habits of the animal. When in the water, the flat points become closely applied together, and afford a waterproof covering to the fine under fur; and when in its under-ground galleries, their peculiar texture and bent form permits the animal to move either backwards or forwards without inconvenience, and without exposing the skin to the dirt."\*

A full-grown *Ornithorhynchus* is about two feet in length, including the beak and the tail; of which the former measures two inches and a half,

\* Nat. Lib. MARSUPIALIA, 311.

and the latter five inches. The general colour is deep brown; (rich red brown in some specimens;) the under parts much paler; a white spot is situated in front of each eye. It is found both in New South Wales and Van Diemen's Land.



ORNITHORHYNCHUS.

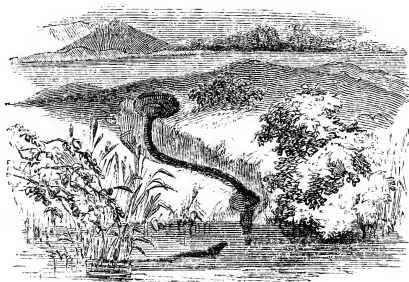
Our acquaintance with the economy of the *Ornithorhynchus* in a state of nature, we owe entirely to the researches of Mr. George Bennett; and we willingly close this volume with some extracts from his valuable communication on this subject to the Zoological Society; the more copious, as the details of the habits of an animal so anomalous cannot but be of singular interest.

“The *Water-Moles* (as these animals are called by the colonists) chiefly frequent the open and

tranquil parts of the stream covered with aquatic plants, where the steep and shaded banks afford excellent situations for the excavation of their burrows. Such expanses of water are by the colonists called *ponds*. The animals may be readily recognized by their dark bodies just seen level with the surface, above which the head is slightly raised, and by the circles made in the water around them by their paddling action. On the slightest alarm they instantly disappear; and, indeed, they seldom remain longer on the surface than one or two minutes, but dive head-foremost, with an audible splash, reappearing, if not alarmed, a short distance from the spot at which they dived. Their action is so rapid, and their sense of danger so lively, that the mere act of levelling the gun is sufficient to cause their instant disappearance; and it is, consequently, only by watching them when diving, and levelling the piece in a direction towards the spot at which they seem likely to reappear that a fair shot at them can be obtained. A near shot is absolutely requisite; and when wounded they usually sink immediately, but quickly reappear on the surface."

Mr. Bennett has described the burrows of these interesting animals, several of which he examined; they are constructed in the bank of the river, the entrance being above the surface, usually concealed among the herbage. Though the mouth is large, it quickly diminishes to a passage barely admitting the animal, but running along through the earth in a serpentine direction, sometimes to the distance of fifty feet, and terminating in a small chamber. Here the nest is placed, consisting of dried grass and weeds.

After having traced such a burrow “for the distance of ten feet, and having just delved down upon it so as to perceive it still continuing its course up the bank, the beak and head of a *Water Mole* were seen protruding for an instant from the upper part, as if it had been disturbed from its repose, and had come down to see what we were about with its habitation. It only remained for an instant; for as soon as it beheld us . . . . it immediately turned up to take refuge in that



BURROW OF ORNITHORHYNCHUS.

part of the burrow which yet remained unexplored. In turning round, however, it was seized by the hind-leg and dragged out. The animal appeared very much alarmed when it was hauled out of its subterraneous dwelling; . . . . it uttered no sound, nor did it attempt to bite; and proved to be a full-grown female. When I held the unfortunate *Ornithorhynchus* in my hands its bright little eyes glistened, and the orifices of the ears were expanded and contracted alternately, as if eager to catch the slightest sound,

while its heart palpitated violently with fear and anxiety."

The female thus taken from the burrow was placed in a cask with water, mud, and grass, where it soon became tranquil, and reconciled to its captivity. The next morning, tying a long cord to its leg, Mr. Bennett roused it, and placed it on the bank of the river in order to indulge it with a bathe; and a similar indulgence was granted to it on the next day. On these occasions "it was exceedingly lively, swam in the centre of the stream, and appeared in excellent health and spirits. The water at one part of the river being very clear, I saw its motions distinctly under the water. On diving it sank speedily to the bottom, swam there for a short distance, and then rose again to the surface; it ranged the banks, guiding itself in its progress according to the impressions received by the mandibles, which appeared to me to be used as very delicate organs of touch. It seemed to feed well; for whenever it inserted its beak into the mud it evidently procured some food from thence, as on raising the head, after withdrawing the beak, the mandibles were seen in lateral motion, as is usual when the animal masticates. Although several insects were basking and fluttering about the surface, close to it, no attempt was made to capture them . . . . After feeding it would lie sometimes on the grassy bank, and at others partly in and partly out of the water, combing and cleaning its coat, as usual, with the claws of the hind-feet. After permitting it to swim, feed, and clean itself for an hour, it was replaced, although with great reluctance on its own part, in its box; it did not, however, as before, betake itself to repose, but

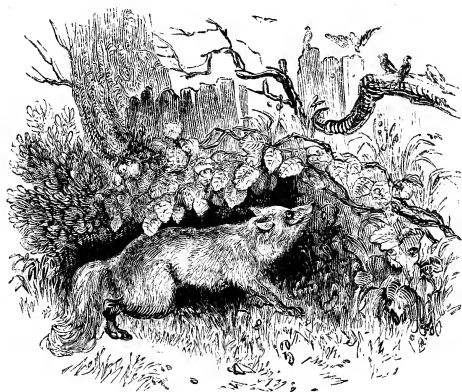
commenced and continued a scratching on the sides of the box."

This individual managed to make her escape from confinement; but Mr. Bennett subsequently took two half-grown young ones from a burrow, and captured a very exhausted female, which he conjectured to be their mother. The latter survived but a few days, but the young remained in his possession upwards of a month. The details of the manners of this little family in their captivity are very amusing. Mr. Bennett observes of them, "The young sleep in various postures; sometimes in an extended position; and often rolled up, like a hedgehog, in the form of a ball. They formed an interesting group, lying in various attitudes in the box in which I had placed them, and seeming happy and content. Thus, for instance, one lies curled up like a dog, keeping its back warm with the flattened tail, which is brought over it; while the other lies stretched on its back, the head resting, by way of a pillow, on the body of the old one, which lies on its side, with the back resting against the box; the delicate beak, and smooth, clean fur of the young, contrasting with the rougher and dirtier appearance of the older one: all fast asleep . . . . One evening both the young came out about dusk, and went as usual, and ate food from the saucer, and then commenced playing with one another, like two puppies, attacking with their mandibles, and raising their fore-paws against each other. In the struggle one would get thrust down, and at the moment when the spectator would expect it to rise again and renew the combat, it would commence scratching itself, its antagonist looking

on, and waiting for the sport to be renewed. When running they are exceedingly animated; their little eyes glisten; and the orifices of their ears contract and dilate with rapidity; if taken into the hands at this time for examination they struggle violently to escape; and their loose integuments make it difficult to retain them. Their eyes being placed so high on the head, they do not see objects well in a straight line, and consequently run against everything in the room during their perambulations, spreading confusion among all the light and readily-overtunable articles . . . Sometimes I have been able to enter into play with them by scratching and tickling them with my finger; they seemed to enjoy it exceedingly, opening their mandibles, and biting playfully at the finger, and moving about like puppies indulged with similar treatment. As well as combing their fur to clean it when wet, I have also seen them peck at it with their beak (if the term may be allowed) as a duck would clean its feathers. When I placed them in a pan of deep water they were eager to get out after being there for only a short time; but when the water was shallow, with a turf of grass in one corner, they enjoyed it exceedingly. They would sport together, attacking one another with their mandibles, and roll over in the water in the midst of their gambols, and would afterwards retire, when tired, to the turf, where they would lie, combing themselves. They appeared to be in a great measure nocturnal, preferring the twilight to the bright glare of day."

The *Ornithorhynchus* has never yet been brought alive to Europe; but these and similar accounts

indicate that it may yet be hoped for; as it seems no insuperable difficulty would occur in providing them with food on the voyage. Mr. Bennett fed his young captives on soaked bread, chopped egg, and meat minced very small.



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LONDON :

Printed by S. & J. BENTLEY, WILSON, and FLEY,  
Bangor House, Shoe Lane.







